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THE ARTICLE on the distribution of pig iron production, which is given on another page, shows that the main increase in the output of iron during the last decade has been in those districts which are supplied with iron ore from the Lake Superior region. It will serve to illustrate and emphasize the statements made in our issue of January 3 last, as to the growing influence of the Lake ore supply upon the iron trade. The cheapness and abundance of Lake ores have, in fact, checked the development of local supplies, and have exercised a controlling influence on the location of new furnaces, for some time past.

⚒

THE WELL-MERITED distinction which has been won latley by Mr. Peter Cooper Hewitt, as a consequence of his ingenious inventions of electrical apparatus, will be a source of pleasure to those who esteemed his father, Abram S. Hewitt, whose useful career was but recently closed amid the honor and respect of the entire community. Hereditary titles and hereditary wealth often transmit great powers for good and ill to men but little qualified to use them rightly; a heritage of high intelligence is a far more splendid endowment, and carries with it a distinction superior to any other accident of birth. Believing, as we do, that character is the final test of all manhood, under any form of government and amid any kind of social dispensation, we welcome the evidence of a heredity of the best type of citizenship, and we are glad to see that so good and useful a life as Abram Hewitt's is perpetuated in that of his capable sons.

⚒

THE ENORMOUS development of traffic in this country during the year just closed is difficult to realize, until one sees some definite figures. The report of the Pennsylvania Railroad for 1902, which has just been made public, presents some suggestive facts. The traffic of the main line of the road—between New York and Pittsburg—reached a total of 8,500,000,000 ton-miles; the traffic average was 23,764,530 tons per mile of road, and the average freight earnings were $116,479 per mile. These figures have never heretofore been approached in this country—or in any other.

The Pennsylvania managers admit that, even with all the improvements made in recent years, the road was unable to meet the demand upon it for transportation. They recognize, however, the obligations of the company to the public—as some railroad managers do not—and plans have been made to spend $67,000,000 during the next two years to increase the facilities for handling freight.

⚒

IT IS STATED that a large and rich gold ledge has been discovered in the country north of Cape Nome, and that it is the lode for which Capt. John Coogan made a fruitless search, as a consequence of information obtained from an Eskimo. The celebrated mountain-volcano, Popocatepetl, is reported to have been sold for $5,000,000 by a Mexican general, who owned the ground covered by the crater. This sale is based upon the value of the volcano as a source of sulphur, and it is rumored that the Standard Oil Company is the purchaser. Meanwhile, we learn from Guadalajara that Mt. Colima is in active eruption, evidently ready to redress the balance of sulphur removed from Popocatepetl.

During the week there was a little unpleasantness underground in the Pennsylvania mine at Butte, between the contending forces of Heinze and the Amalgamated Company. Occurrences such as these are a striking comment on our mining laws. In Colorado the Labor Union is again on the rampage, this time at Colorado City, where the big chlorination plant known as the Standard Mill is in a state of siege, but, we are glad to know, is still in continuous operation.

⚒

WE PUBLISH elsewhere a valuable paper by Mr. C. W. Merrill, dealing with the cyanide practice of the Homestake Company. That well-known type of low-grade gold ore exploitation was very backward in its methods of milling until quite recently. A few years ago the tailings from the Homestake mills furnished a profitable occupation to enterprising Cornishmen who gathered the values which went to waste. The amalgamating tables were inadequate in length and the tailings treatment was crude to a degree which was in striking contrast to the magnitude of the operations carried on at Lead City. From Mr. Merrill's description we gather that the plate surface for amalgamation has been much lengthened and that, under his direction, the tailings are receiving scientific and exhaustive treatment. The total costs of cyanidation are stated to be 35 cents per ton, as against 55 to 72 cents at a number of large plants in the Transvaal. In India the cost of treatment, according to Mr. Alfred James, is lower, ranging from

44 to 64 cents per ton; and in Australia generally cyanidation expenses range from 64 to $1.25. In Brazil, at the Sao Bento mine, the cost is stated to be 52 cents per ton. The slimes, which still go to waste after the tailings treatment, assay 80 cents to $1.10 per ton. We learn that Mr. Thomas J. Grier, the general manager, so long identified with the success of the Homestake, is working out a new method which promises to be of great importance, not only to his company but to the industry at large.

⚒

In our issue of February 14 we referred to the advertised prospectus of a gold mining company in Maine, the statements of which appeared to us extravagant in their character. In another column of the present issue we publish a letter from the manager of the company referred to, taking exception to our notice. We give the letter because we believe in allowing both sides of a question a fair hearing; but we are still inclined to believe that the importance of the gold deposits is overestimated. That some gold has been found in Maine is well known; but the existence of placer grounds on which farmers can easily pan out $2 to $5 a day has not heretofore been suspected. If it had been generally known, as our correspondent claims, we cannot understand why, in a State where farm laborers certainly do not earn over $1 a day, there has not been a rush to the placers of Swift River, where five times that amount can be earned. The average Maine farmer is a shrewd man, and generally loses no opportunity to better himself; and it is a mystery that he has so long neglected the chances for gathering gold at his door. Certainly the United States Assay Office returns show no gold from Maine, where the farmers can accumulate it so readily. We do not wish to discourage mining enterprise anywhere; but the value of Maine gold mines remains to be proved by actual production.

⚒

At last the drought in Australia has been definitely broken by a satisfactory wet season. While it has been most severely felt by the pastoral and agricultural interests and has destroyed a large portion of the cattle and sheep of the federated States it has also injured the mining industry, which employs water directly in many of its operations and needs a supply of it for the production of the necessaries of life. The severity of the Australian drought can be inferred from the records compiled by Mr. Russell, the meteorologist of New South Wales; from his report we take the subjoined statement of the rainfall at a few well-known mining centers; by way of comparison we have added the rainfall in the vicinity of New York:

District.	Rainfall during 1902.	Average Rainfall.
Broken Hill	3.32 ins.	9.28 ins.
Cobar	5.64 ins.	15.44 ins.
Hill End	18.00 ins.	28.00 ins.
Adelong	16.00 ins.	24.00 ins.
Wyalong	11.00 ins.	19.00 ins.
New York	47.07 ins.	44.62 ins.

From these figures it will be seen that in regions, none too bountifully blessed by rain even at the best of times, the quantity of moisture precipitated during the whole of 1902 was only from one-third to two-thirds of the normal amount. We congratulate our Australian friends on the ending of these unfavorable conditions and trust it will be long before their country is again similarly afflicted.

CYANIDE POISINING.

At a recent meeting of the Council of the Chemical and Metallurgical Society of South Africa, the matter of cyanide poisoning and its treatment was brought forward and discussed, and it was unanimously decided that in view of the widespread use of the cyanide process and the accidents and ailments which arise therefrom, it was very desirable that the society should investigate the nature of the poisoning and examine into the various remedies, antidotes and treatments, with a view to discovering the most efficacious procedure, in cases of poisoning, and recommending the same for general adoption by the industry. In pursuance of this discussion the Council has appointed a sub-committee, consisting of Messrs. A. F. Crosse, E. H. Johnson and J. Yates, to carry out the necessary investigations and to report thereon. Dr. Porter, the medical officer of health of Johannesburg, has also kindly consented to act on the committee.

This committee of representative men desires to compile particulars of the fatalities which have occurred, and also the ailments arising from cyanide poisoning, together with an account of the treatment adopted and its effects. Any of our readers in this country or elsewhere who have information on this important subject will do a service, both humane and economic, by communicating their data to the secretary of the committee, Mr. Frederick Rowland, at Johannesburg, or to this Journal, for transmission to the committee.

⚒

THE ALASKAN BOUNDARY.

Sir Charles Tupper is reported to have made the threat that the Canadian Parliament will pass a law preventing Americans from engaging in mining in the Yukon territory because of a feeling of resentment over the Alaskan boundary dispute. It is also stated that such a restriction of American activity would be similar in its effects to the law which forbids Canadians from mining in the United States.

If Sir Charles said anything of the sort—which we doubt—he was as ill advised as he was inaccurate. Canadians, like any other aliens, are permitted every facility to engage in mining in this country; it is true, they cannot take up mining claims in their own names, unless they become naturalized, but this is no great hardship, and it is obviated in many ways. Throughout our Western mining regions men of every nationality are to be found working side by side, and we are cognizant of many a son of "Our Lady of the Snows" who has achieved success and acquired wealth by reason of the generous treatment meted out to all men who have taken their part in the development of the Empire of the West. Any such foolish talk as that imputed to Sir Charles Tupper, and heard more than once before in connection with this same Alaskan "tempest in a teapot," is seriously to be deprecated. In every land—whether north or south of the equator—the American and the Englishman have worked side by side, actuated by a common sense of fair play and a racial disregard of petty tyrannies. It is so in South Africa, Australia, China, South America—in lands as far as the poles asunder,—in every one of these regions, whether under the old flag or the new, there has been a willingness to share alike in the conquest of nature and the development of the waste places of the earth. We trust that no ill-advised politician will be able to stir up the petty jealousies voiced by the Canadian gentleman who lacks the proverbial philosophy heretofore associated with his name.

⚒

AFFAIRS ON THE RAND

The Transvaal gold output for February is slightly under that of January, but this is simply due to the fact that the second month in the year has three days less than the first. The average daily production was about 7,070 oz., while in January it was 6,428 oz. This means that the industry is not making any marked advance. At the end of a period of five months the rate of production has increased only 17,000 oz. per month. Mr. Chamberlain has come and gone, with an added luster to his reputation and a betterment of political conditions in South Africa, but those who direct the gold mines of the Rand are less cheerful than before and the general outlook is as gloomy as ever.

In so far as the mining interests could meet the demands of Downing Street, it has been done, and it is evident that the contribution to the war fund is fully as large as expected by those in position to understand the resources of the country. But from the other side there has been very little counter-assurance, in fact, none of practical value, and the mine managers find themselves in as bad a fix with regard to labor as before Mr. Chamberlain's arrival; really, the position is worse, for all hope of the importation of Chinese coolies is for the present off, and the managers can now look forward only to a long period of effort and experiment in the direction of more economically handled white and native labor, with possibly some benefits through cheap white labor.

The latter idea is, of course, particularly attractive to the Home Government, in that it offers a possible solution of the race question through an increase of the English vote, but it can never result in anything but failure so far as the mines are concerned, because it is utterly impracticable to work two classes of whites together. The cheaper class will be envious of the better paid, and, of course, the latter will always be jealous of any possible encroachments on their position by the cheaper men. Even if the two classes could work harmoniously together, there will certainly be trouble through labor combinations. The Unions are endeavoring to get a foothold at Johannesburg, and it is needless to say they will be quick to take advantage of the ignorance of the lower type of labor, just as has been done in Colorado and the Northwest. This phase of the question is rendered still more serious from the fact that during Mr. Chamberlain's visit, the Government has seen fit, evidently for political purposes, to recognize the Unions and invite them to join in conference with the principal public organizations, and advise on various questions of popular interest.

For these reasons one no longer hears, either in London or on the spot, the cheerful prophecy of a quick return to the old prosperity. It looks

very much as though there were harder times ahead for the Rand than in the past, and the most that can be hoped for is that the reality of these hardships will soon be apparent to the Government, and that it will not be slow to sanction measures for the relief of the situation.

⚒

RECENT GEOLOGICAL THEORIES.

"Without speculation there is no good and original observation." This was said by the author of "The Origin of Species," himself a man who, as his friend Huxley said, "abhorred mere speculation as nature abhors a vacuum."

Of late those of us who are interested in mining and in the technical knowledge which aids that industry have been stimulated from time to time by the projection across the intellectual horizon of a succession of theories explanatory of the origin of metallic ores. One theory has hardly been put to the trial of observation before another has collided with it, so that to-day a striking diversity of views claims our attention and we are excited to a high degree of interest in the study of ore deposits. Veteran authorities are inclined to deprecate the unseemly haste which appears to them to mark the publication of new ideas and, pointing to the philosophic patience of the Lyells and Darwins of an older generation who collected data for half a lifetime and ruminated over them for most of the other half before they came forward with well digested and splendidly supported explanations of natural laws, they feel justified in objecting to the confusion created by the simultaneous submission of a number of speculations of a revolutionary character.

We confess to a feeling of sympathy with both, and a keen appreciation of the aggressiveness of the younger men. "The scientific man accepts his limitations and does not expect to arrive at absolute verity. He observes, and when he has advanced far enough to begin to generalize, he formulates his ideas as an hypothesis to serve as a basis on which to work until some one has suggested something better." This was said by Huxley also. He had been too long obstructed by the Mosaic cosmogony not to feel a bitter dislike of any artificial hindrance to scientific investigation; in his opinion a theory was to be respected so long as it served its purpose of directing observation along the right road, but as soon as it played the part of a barricade it behooved all seekers after knowledge to tear it down and proceed unhindered along the narrow way which leads to truth. This is not an unruly spirit, but a generous one, it has fathered a few bastards like the *Bathybius* theory, but it has bred a progeny of splendid philosophies, from the Nebular Hypothesis to Evolution.

Under the present dispensation of scientific research there are ten times as many investigators along any line of inquiry as there were fifty years ago. Conjecture, speculation and theory are enormously more active than they were in the days when geology lay in the cradle of Lyell's "Principles." It is useless to try to smother the eager voices which earnestly hasten to speak of that which they have seen. Let them speak out and then—correct them if they are wrong, disprove them if they are too hasty, so that out of the correction as out of the suggestion some truth shall come.

The fact is, that in dealing with such a tremendous subject as ore deposition there will always be much concerning which we can never be certain. Inductive reasoning from facts will carry us down to the bottom of the mine, but deduction from principles must then carry the fairy wand of imagination which finds a way to the deep where human eye cannot penetrate. Therefore, positiveness of statement is impossible, and a reasonable probability is the utmost goal of our unwearied seeking.

Ill-considered speculations are obviously undesirable, but it seems to us that the greater harm may be done by the failure to discuss the unverified hypotheses of the day. If a man is a fool, let him alone in his folly; but if a geologist, quickened by the acquirement of new evidence, hastens to formulate a conjecture, thank him for what is good in it and combat him for what is wrong. There is too little discussion and too much of essay writing. It is possible to criticise with penetration and yet to be polite. Such criticism is a compliment to the author and a gain to all who are interested in the subject. We advocate a free discussion of principles, a winnowing of fact from fancy, so that the solid observation may be separated from the light chaff of careless guess. To the miner, to whom the subject of ore deposition is vitally important, it is of paramount interest that the authorities on the subject should come out into the arena and discuss the principles at issue, to the greater glory of geology and the general enlightenment of the community.

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FEBRUARY DIVIDENDS.

The dividends distributed during February by corporations identified with the mineral industry of the United States were the largest in five months. This occurred despite the fact that fewer companies made payments and several reported less than last year. In all, 38 metal mines and industrial companies paid a total of $13,100,930, and of this amount $8,930,497, or over 68 per cent, was the regular quarterly dividend of 1¾ per cent on the preferred stock of the United States Steel Corporation. This is the seventh dividend paid by the Steel Trust on its $510,314,100 of outstanding preferred stock. There have also been declared seven quarterly dividends of 1 per cent each on the $508,525,700 of common stock issued, the latest being payable in March. This shows that the Steel Corporation has declared in one year and nine months dividends aggregating $88,300,558 on a total issued capital stock of $1,018,839,800. It is interesting to add that the dividends declared by the Standard Oil Company in the same period amounted to $78,370,000 on an issued capital of $97,000,000, the latest being payable in March at the rate of 80 per cent per annum, or 20 per cent quarterly. Such enormous dividends make the United States Steel Corporation and the Standard Oil Company the two leading industrial combinations in the world.

In February three copper mines paid $1,520,994, or 67.5 per cent of the total amount reported by all metal mines. The Amalgamated Copper Company, of Montana, holds first place with $769,430, which is ½ per cent quarterly on its issued capital stock of $153,887,900. It should be stated that this dividend was earned on the stocks of subsidiary concerns forming the Amalgamated Copper Company and not from operating mines direct. Next in importance is the Arizona Copper Company, controlled in Great Britain and having extensive mines and smelting works at Clifton, Arizona. It paid $501,564, which is equivalent to $1.32, or over 26 per cent on the $317,220 of deferred and $1,582,650 of preferred ordinary shares issued. Third place is given to the Quincy Mining Company, of Michigan, which paid $250,000 as a 10 per cent semi-annual dividend on $2,500,000. This property has yielded since its incorporation dividends aggregating $13,820,000, which is equal to 552.4 per cent on the capitalization—an excellent return on the $200,000 originally invested.

Fewer gold, silver and lead mines paid dividends in February, as many of them made quarterly disbursements in January. Only 15 properties reported dividends of $433,036, mostly as regular monthly payments.

The New Jersey Zinc Company was the only zinc property reporting; it paid $300,000, which is at the rate of 12 per cent per annum on $10,000,000 capital.

The industrial list paid dividends of $10,846,900, and was led by five iron and steel companies which declared $9,974,832, or nearly 92 per cent. The United States Steel Corporation, as noted above, was the largest payer. The Cambria Steel Company, of Pennsylvania, paid $675,000 as a semi-annual dividend of 1½ per cent on $45,000,000 stock issued. Another large payment was that made by the Allis-Chalmers Company, the well-known mining machinery consolidation, which distributed $284,375, as the seventh quarterly dividend of 1¾ per cent on $16,250,000 of preferred stock.

Only two coal and coke companies reported $242,500 in dividends, and of this amount the Consolidation Coal Company, of Maryland, contributed $205,000 as its regular 2 per cent annual dividend.

The dividends paid by 9 petroleum and natural gas companies amounted to $514,318, and show an increase over January. At the head of these is the Philadelphia Company (natural gas), which declared $231,406 as a 1½ per cent quarterly dividend on $15,427,100 of common stock. This company also pays 5 per cent per annum on its $3,998,350 of preferred stock. The petroleum companies were located in Texas and California.

Three graphite and borax companies declared $115,250 in regular dividends.

In addition to the above, there were paid in dividends by 12 Mexican mines a total of $219,139 gold. This is less than was reported in January, the difference being due principally to the variation in the exchange value of the Mexican dollar. The largest dividend was paid by the Greene Consolidated Copper Company (controlled in New York), amounting to $144,000, which is equal to 2 per cent on $7,200,000 stock. One Central American gold mine, also owned in New York, paid $15,000 as a monthly dividend at the rate of 12 per cent per annum on $1,500,000.

Numerous other dividends have been paid by private and close corporations which do not report. Judging from the extensive operations of many of these properties, it is evident that handsome profits are being divided among the few shareholders.

MARKET CONDITIONS.

The metal markets show an uninterrupted continuance of the strength which has characterized them for some weeks past. Conditions generally appear favorable and there is no reason to anticipate any reaction for the present. The advances in price have been somewhat slow, but have been held much better than would probably have been the case had they been more rapid.

Copper continues in demand and buyers are on the market quite freely. A further advance in price is registered this week and it seems probable that this is not the limit of the upward movement. Consumption is very heavy in all directions and metal for early delivery is scarce. The report of the Bureau of Statistics shows some falling off in exports for January, but since then foreign orders have increased and foreign buyers are quite active.

Tin has again advanced and the speculative movement abroad appears to be quite strong.

Lead remains unchanged in price. Demand is large, however, and buyers are taking the metal somewhat more freely. Spelter is strong and has again registered a slight advance, consumers taking all the metal which is offered, while producers are not too heavily stocked.

Silver has improved somewhat on the London report of increased buying for India, and there are prospects that the metal will be required for coinage by the Indian Government before long.

In the iron and steel markets there is still a little hesitation. Buying of pig iron has been on a large scale. Bessemer requirements are fairly well filled for the present, but there has been considerable contracting in basic pig for the last quarter of the year. In foundry iron the southern furnaces are now selling for the second half of the year and report a great many inquiries. In finished material there is quite a rush for structural iron, and there has also been considerable buying of bars and plates. It has been explained that the advance in wire rope products recently noted has been made to counterbalance the low price which prevailed for some time near the close of last year. The operations of mills and furnaces in the Central West are still interrupted by irregular transportation, though some improvement in this respect is reported during the present week. The effects of the recent storms have passed over, and the railroads are making a determined effort to clear their tracks.

The western coal trade is still demoralized by the railroad troubles. The large cities are gradually getting a little supply, especially as the milder weather has decreased the demand, but in the smaller towns and villages there is a good deal of trouble.

The seaboard bituminous trade continues quiet and even dull, as is apt to be the case while contracts for the new year are under discussion. The lower grades of coal are in pretty good supply, and with prices weak. The better grades are in demand. Car supply at the mines shows little improvement.

The anthracite trade has lost all excitement, although there remains a good demand in the West and also at interior points in the East. Along the seaboard, supplies are generally sufficient and the market it quiet. It is hardly likely that the large producing companies will make any change in tidewater prices until the Anthracite Arbitration Commission has made its report.

DISCUSSION.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the ENGINEERING AND MINING JOURNAL.

EUTECTIC OR BENMUTIC.

To the Editor:

Sir.—Like Prof. Howe, I have found that the use of the term "eutectic," as applied to steel, is confusing, especially in teaching, even though it has the advantage of impressing the analogy between liquid and solid solutions. The adoption of the term "benmutic," which he suggests, is a way out of the difficulty, and the terms are sufficiently alike to suggest the similarity between the substances that they represent.

I am also in favor of the term "osmondite," which Prof. Howe proposes to give to the solid solution of carbon in iron. The present descriptive nomenclature is so cumbrous that one is tempted to use the term "martensite" in default of any other, and I notice that Prof. Van't Hoff has done this in his paper "Zinn Gips und Stahl vom physikalisch-chemischen Standpunkt." It is unnecessary to state that we are making an unwarrantable assumption in concluding that the martensite of quenched steel is identical with the solution of carbon in red hot steel before the quenching took place.

The adoption of a separate term, "osmondite," would avoid the difficulty and would be a permanent record of the debt which metallurgical science owes to M. Osmond.

ALFRED STANSFIELD.

McGill University, Montreal, Feb. 25, 1903.

To the Editor:

Sir.—In the ENGINEERING AND MINING JOURNAL of January 24, 1903, I read with interest a letter from Prof. Howe, in which he points out the difficulty he has found in making students realize that pure typical hardenite (21 Fe, Fe_3C) is an eutectic as defined by Guthrie.

I fully sympathize with the professor, but have never personally experienced his perplexity, because from the first I recognized the unsuitability of M. Osmond's proposed term, and hence have never used it. I notice that Prof. Howe accepts M. Osmond's figure of 0.80 per cent of carbon as coincident with the maximum proportion of the so-called eutectic. This actual carbon percentage is not a question of theory, but of fact. As a matter of fact, M. Osmond's figure is not quite accurate. In April, 1895, I submitted to the Council of the Institution of Civil Engineers a paper on "The Influence of Carbon on Iron." This paper was read (after the distribution of copies some six months in advance) in December, 1895. In this memoir I specified for the first time the quantitative composition of Sorby's pearly constituent and its flint-hard transformation product as trapped in steel suddenly quenched from a red heat. I conclusively proved that the critical micro-graphic point was, in nearly pure iron, almost exactly at 0.9 per cent carbon.

I also showed by measurements of the heats of carbon transformation that the maximum heat of recalescence was obtained from the 0.895 per cent carbon steel, which when normally crystallized exhibited 100 per cent of pearlite under the microscope. Below is tabulated an extract from my thermal records:

Carbon %.	Heat of recalescence evolved at Ar 1	
	Equivalent rise in pyrometric millimetres.	Equivalent rise in temperature of steel in ° C.
0.740	20.0	62.0
0.895	23.6	73.2
1.200	21.3	66.0

It will be seen that carbon 0.74 per cent and carbon 1.20 per cent both evolved palpably less heat than carbon 0.895 per cent. The sample with 0.74 per cent also shows to this day the presence of a considerable quantity of structurally free ferrite. I challenge any metallurgist to prove that 0.8 evolves more heat than 0.9 per cent carbon at Ar 1 in a pure iron and carbon steel. I also challenge the production of a 0.8 per cent carbon steel which, after a normal crystallization, is without structurally free ferrite.

In the 1895 paper I proposed to call the 0.9 per cent carbon steel "saturated"; for steels containing less than 0.9 per cent carbon I suggested the term "unsaturated"; while steels containing more than 0.9 per cent were to be distinguished as "super-saturated." This nomenclature was, in the discussion, definitely accepted by M. Osmond.

The terms employed were theoretically neutral and accurately expressed the micrographic and thermal facts. Some time afterwards, however, the inapplicable terms "eutectic," "hypo-eutectic" and "hyper-eutectic" were proposed by M. Osmond and adopted by the allotropic school. Prof. Howe has rendered good service in calling the attention of his party to the scientific error of their ways.

But, sir, Prof. Howe now proposes to his fellow schoolmen the terms "benmutic," "sub-benmutic" and "super-benmutic." At the same time I gather from Prof. Howe's letter that (to use a sample phrase) "hyper-eumetamorphic-steel" would be a highly desirable and sound expression, if it were not "jargon."

I think, sir, it is possible that some people may consider that Prof. Howe's proposed alternative term "super-benmutic" steel, even if not jargon, does nevertheless, closely verge on the pedantic. Its use also involves a serious danger which seems to have escaped the attention of Prof. Howe. Quite recently, a learned Oriental professor has assured us that metals feel. Imagine, sir, the feelings of a conscientious but highly sensitive razor, on receiving the information that it was composed of "hyper-benmutic steel." I fear, sir, the useful little implement could never smile, or rather shave, again.

For me, sir, and I venture to think I may also speak for many members of the "carbonist" school, the terms "unsaturated," "saturated" and "super-saturated" steels will suffice to the end of the chapter, because the exact molecular configuration of hardenite seems likely to remain a mystery to the end of our time.

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Prof. Howe also calls attention to "the anomaly of assigning definite names to decomposition products." At the last May meeting of the Iron and Steel Institute Mr. Andrew McWilliam and I emphatically called attention to this anomaly. Prof. Howe, however, proposes that this erroneous nomenclature should be perpetuated because of its convenience. It will be well not to sacrifice scientific truth to alleged convenience.

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I may, however, remark that there are two constituents of steel which do not terminate in "ite," namely ferrous sulphide FeS and manganous sulphide MnS. Prof. Howe does not see any necessity to call these substances "ites," because they have a definite chemical composition!

The question which will at once spring to the lips of every metallographist will be, Why did Prof. Howe confer upon the "intensely hard constituent" of my venerable friend, Dr. Sorby, the name cementite, since this substance has been repeatedly proved to have the definite, chemical formula Fe_3C, or a multiple thereof?

The chances of micrographic life are very unequal. It was the misfortune of these sulphides to be micrographically discovered by me. Had an allotropic instead of a carbonist physician presided on the occasion of their birth they would probably at the present moment rejoice respectively in the imposing titles of "johnesteadite" and "hmarionhoweite" to the great advantage of steel metallurgy in general. These constituents, therefore, being unavailable for christening purposes, and no others being at present visible, the manufacture of new "ites" would to the ordinary mind appear impossible. But in the vocabulary of Prof. Howe this word does not exist. He evidently considers that it is by no means indispensable that a micrographic constituent should be visible. He, therefore, proposes to call the transformation product of pearlite which exists at a red heat and, therefore, cannot be seen under the microscope "osmondite."

After admitting the fact that the name Osmond richly deserves perpetuation, the only argument which can be put forward in opposition to this remarkable proposal is the eloquent silence of a great amazement. But it must be confessed that when this suggestion is made as a means of facilitating the studies of students, Prof. Howe illuminates a letter, which, owing to the nature of the subject dealt with, is necessarily somewhat dry, with a refreshing gleam of cynical and unsuspected humor.

J. O. ARNOLD.

Professor of Metallurgy, University College, Sheffield.

Sheffield, Feb. 17, 1903.

SECONDARY ENRICHMENT.

To the Editor:

Sir.—Before the interesting discussion on the subject of secondary enrichment draws to a close I would like to call attention to one point, which it seems to me has been overlooked, and which is deserving of more than passing thought.

Admitting that the descending surface waters would oxidize the ores, taking copper into solution, and that these copper-bearing solutions precipitated their contents at lower levels, making certain portions of mines, such as those at Butte, doubly rich, we should expect this rich ore to be a product of precipitation. The question is: Do we so find it?

In precipitation the matter held in solution is thrown down in small flocculent particles, each distinct from the other. These form a mass which even in a mushy condition presents more or less of a granular appearance. As the precipitates harden they make a product familiarly known as micro-crystalline. I have before me as I write, a sample of rich ore which I took last fall from the Pennsylvania, one of the big mines of Butte. It is chalcocite, and I would call it amorphous. That this conclusion is sound, I need only quote from the letter of Mr. S. F. Emmons in your issue of February 7. That gentleman says: "The only mineral form that I should feel justified at present in at once assuming a secondary origin for, is the amorphous, so-called sooty sulphide . . . chalcocite and bornite are very frequently the result of secondary enrichment, but I should hesitate to assume that they are necessarily so in all cases." Now, I am aware that ores having the same chemical composition as chalcocite, and presenting a similar appearance, have been made in the laboratory, but the question is: Are they amorphous? Has it been possible to make an amorphous product in the laboratory, in the wet way?

Quite recently a French scientist succeeded in making the ruby in the laboratory, but microscopical tests showed that it fell short of being perfect in having lines of separation—in other words, it was not amorphous.

My observation is that gem-stones generally are amorphous, as are also a large proportion of the rich minerals. Most gold nuggets are amorphous, as is shown by their smooth, apparently polished, exterior. A considerable number of quartz deposits generally are amorphous. Now, how are amorphous products formed? Observation of the greatest siliceous forming area in existence—the Yellowstone National Park—tells us that amorphous quartz is formed by the aid of organic matter. Mr. Weed speaks of this substance as "gelatinous silica" and "vegetable jelly," certainly expressive terms, though I think the name "mineral jelly" better than "vegetable jelly," as analysis of a dried specimen from Emerald spring, given by Mr. Weed himself shows it to contain 93.37 per cent silica.[1] It is this gelatinous substance which, when hard, forms amorphous quartz.

Not only do we find amorphous quartz being made by the aid of vegetation, but we know that one of the gems is so made. Mr. Weed tells us: "Besides the deposits of siliceous sinter formed by the algous vegetation of the hot waters, extensive deposits of sinter are found on the slopes below the Hillside springs, which are due to the growth of mosses. . . . This sinter is not formed by evaporation, nor by any of the causes discussed in considering the precipitation of silica from solution, but is due to the abstraction of silica from the water by the mosses covering the surface of the basins."[2] In most of the deposit formed by the aid of mosses, as is the case of that formed by algae, no trace of the vegetation can be detected. It is possible, however, to find specimens in which the moss is shown in perfect state of preservation, others where the moss is partially decomposed, forming the beautiful moss agate. My friend, Mr. Emil Starz, prominent in Montana as a skilled chemist, accounts for the absence of plant remains in the silica formed by the aid of vegetation by suggesting that the carbon of the plant was changed to carbonic acid gas in the formation of the material. Should this view be confirmed, we can understand the origin of the liquified carbonic acid gas which Sorby informs us is one of the constituents of quartz.

Some of my readers may think I am overlooking the fact that amorphous products may be made by fusion, but fusion certainly has no part in the theory of secondary enrichment; and we are all agreed on one point, and that is that all precious metal deposits, with the quartz accompanying them, were derived in one way or another from substances held in aqueous solution. I only question if in the past we have drawn the lines of distinction between the different forms close enough. Thus we have the product of crystallization, that formed by dehydration or evaporation; second, the micro-crystalline, formed by precipitation; third, the open, porous, honeycombed and the amorphous, formed by the aid of vegetation. It seems to me, therefore, that before the theory of secondary enrichment can be said to rest on a solid formation, its advocates will have to present evidence to overcome all that is before us accounting for the formation of amorphous products.

MATT. W. ALDERSON.

Bald Butte, Mont., Feb. 23, 1903.

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Charles Darwin abhorred mere speculation as nature abhors a vacuum. He was as greedy of cases and precedents as any constitutional lawyer, and all the principles he laid down were capable of being brought to the test of observation and experiment.

All science starts with hypothesis—in other words, with assumptions that are unproved, while they may be, and often are, erroneous; but which are better than nothing to the seeker after order in the maze of phenomena. And the historical progress of every science depends on the criticism of hypothesis—on the gradual stripping off, that is, of their untrue and superfluous parts—until there remains only that exact verbal expression of as much as we know of the fact, and no more, which constitutes a perfect scientific theory.

The Vanadium minerals—descloizite and vanadinite, both of which are vanadates of lead—are used as oxidizing agents in dyeing. Descloizite from the Globe District, Arizona, is being exported to Germany for this purpose. Chromite, at present mainly employed, is being replaced by the vanadium salts because the latter can be regenerated, while the former is consumed.

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The statement that a crystal of calc-spar consists of carbonate of lime, is quite true, if we only mean that, by appropriate processes, it may be resolved into carbonic acid and quicklime. If you pass the same carbonic acid over the very quicklime thus obtained, you will obtain carbonate of lime again; but it will not be calc-spar, nor anything like it.

Huxley's purpose in life, as he expressed it himself, was: "To promote the increase of natural knowledge and to forward the application of scientific methods of investigation to all the problems of life to the best of my ability, in the conviction that there is no alleviation for the sufferings of mankind except veracity of thought and action, and the resolute facing of the world as it is when the garment of make-believe, by which pious hands have hidden its uglier features, is stripped off."

During the half year ending August 31, 1902, the Morro Velho mines produced 52,993 oz. of gold bullion, equal to 41,044 oz. of fine gold, valued at $689,765. The production of the other important gold mines of Brazil, the Ouro Preto, for the year ending June 30, 1902, amounted to 21,258 oz. of fine gold, valued at $448,320.

The following figures represent the shrinkages of castings of different metals: Zinc, 0.3125 in. per foot equals 2.60 per cent; lead, 0.3125 in. per ft., or 2.60 per cent; aluminum, 0.2031 in. per ft., or 1.69 per cent; copper, 0.1875 in. per ft., or 1.56 per cent; brass, 0.1580 in. per ft., or 1.32 per cent; iron pipes, 0.1250 in. per ft., or 1.04 per cent.

MARKET CONDITIONS.

The metal markets show an uninterrupted continuance of the strength which has characterized them for some weeks past. Conditions generally appear favorable and there is no reason to anticipate any reaction for the present. The advances in price have been somewhat slow, but have been held much better than would probably have been the case had they been more rapid.

Copper continues in demand and buyers are on the market quite freely. A further advance in price is registered this week and it seems probable that this is not the limit of the upward movement. Consumption is very heavy in all directions and metal for early delivery is scarce. The report of the Bureau of Statistics shows some falling off in exports for January, but since then foreign orders have increased and foreign buyers are quite active.

Tin has again advanced and the speculative movement abroad appears to be quite strong.

Lead remains unchanged in price. Demand is large, however, and buyers are taking the metal somewhat more freely. Spelter is strong and has again registered a slight advance, consumers taking all the metal which is offered, while producers are not too heavily stocked.

Silver has improved somewhat on the London report of increased buying for India, and there are prospects that the metal will be required for coinage by the Indian Government before long.

In the iron and steel markets there is still a little hesitation. Buying of pig iron has been on a large scale. Bessemer requirements are fairly well filled for the present, but there has been considerable contracting in basic pig for the last quarter of the year. In foundry iron the southern furnaces are now selling for the second half of the year and report a great many inquiries. In finished material there is quite a rush for structural iron, and there has also been considerable buying of bars and plates. It has been explained that the advance in wire rope products recently noted has been made to counterbalance the low price which prevailed for some time near the close of last year. The operations of mills and furnaces in the Central West are still interrupted by irregular transportation, though some improvement in this respect is reported during the present week. The effects of the recent storms have passed over, and the railroads are making a determined effort to clear their tracks.

The western coal trade is still demoralized by the railroad troubles. The large cities are gradually getting a little supply, especially as the milder weather has decreased the demand, but in the smaller towns and villages there is a good deal of trouble.

The seaboard bituminous trade continues quiet and even dull, as is apt to be the case while contracts for the new year are under discussion. The lower grades of coal are in pretty good supply, and with prices weak. The better grades are in demand. Car supply at the mines shows little improvement.

The anthracite trade has lost all excitement, although there remains a good demand in the West and also at interior points in the East. Along the seaboard, supplies are generally sufficient and the market it quiet. It is hardly likely that the large producing companies will make any change in tidewater prices until the Anthracite Arbitration Commission has made its report.

DISCUSSION.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the ENGINEERING AND MINING JOURNAL.

EUTECTIC OR BENMUTIC.

To the Editor:

Sir.—Like Prof. Howe, I have found that the use of the term "eutectic," as applied to steel, is confusing, especially in teaching, even though it has the advantage of impressing the analogy between liquid and solid solutions. The adoption of the term "benmutic," which he suggests, is a way out of the difficulty, and the terms are sufficiently alike to suggest the similarity between the substances that they represent.

I am also in favor of the term "osmondite," which Prof. Howe proposes to give to the solid solution of carbon in iron. The present descriptive nomenclature is so cumbrous that one is tempted to use the term "martensite" in default of any other, and I notice that Prof. Van't Hoff has done this in his paper "Zinn Gips und Stahl vom physikalisch-chemischen Standpunkt." It is unnecessary to state that we are making an unwarrantable assumption in concluding that the martensite of quenched steel is identical with the solution of carbon in red hot steel before the quenching took place.

The adoption of a separate term, "osmondite," would avoid the difficulty and would be a permanent record of the debt which metallurgical science owes to M. Osmond.

ALFRED STANSFIELD.

McGill University, Montreal, Feb. 25, 1903.

To the Editor:

Sir.—In the ENGINEERING AND MINING JOURNAL of January 24, 1903, I read with interest a letter from Prof. Howe, in which he points out the difficulty he has found in making students realize that pure typical hardenite (21 Fe, Fe_3C) is an eutectic as defined by Guthrie.

I fully sympathize with the professor, but have never personally experienced his perplexity, because from the first I recognized the unsuitability of M. Osmond's proposed term, and hence have never used it. I notice that Prof. Howe accepts M. Osmond's figure of 0.80 per cent of carbon as coincident with the maximum proportion of the so-called eutectic. This actual carbon percentage is not a question of theory, but of fact. As a matter of fact, M. Osmond's figure is not quite accurate. In April, 1895, I submitted to the Council of the Institution of Civil Engineers a paper on "The Influence of Carbon on Iron." This paper was read (after the distribution of copies some six months in advance) in December, 1895. In this memoir I specified for the first time the quantitative composition of Sorby's pearly constituent and its flint-hard transformation product as trapped in steel suddenly quenched from a red heat. I conclusively proved that the critical micro-graphic point was, in nearly pure iron, almost exactly at 0.9 per cent carbon.

I also showed by measurements of the heats of carbon transformation that the maximum heat of recalescence was obtained from the 0.895 per cent carbon steel, which when normally crystallized exhibited 100 per cent of pearlite under the microscope. Below is tabulated an extract from my thermal records:

Carbon %.	Heat of recalescence evolved at Ar 1	
	Equivalent rise in pyrometric millimetres.	Equivalent rise in temperature of steel in ° C.
0.740	20.0	62.0
0.895	23.6	73.2
1.200	21.3	66.0

It will be seen that carbon 0.74 per cent and carbon 1.20 per cent both evolved palpably less heat than carbon 0.895 per cent. The sample with 0.74 per cent also shows to this day the presence of a considerable quantity of structurally free ferrite. I challenge any metallurgist to prove that 0.8 evolves more heat than 0.9 per cent carbon at Ar 1 in a pure iron and carbon steel. I also challenge the production of a 0.8 per cent carbon steel which, after a normal crystallization, is without structurally free ferrite.

In the 1895 paper I proposed to call the 0.9 per cent carbon steel "saturated"; for steels containing less than 0.9 per cent carbon I suggested the term "unsaturated"; while steels containing more than 0.9 per cent were to be distinguished as "super-saturated." This nomenclature was, in the discussion, definitely accepted by M. Osmond.

The terms employed were theoretically neutral and accurately expressed the micrographic and thermal facts. Some time afterwards, however, the inapplicable terms "eutectic," "hypo-eutectic" and "hyper-eutectic" were proposed by M. Osmond and adopted by the allotropic school. Prof. Howe has rendered good service in calling the attention of his party to the scientific error of their ways.

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Not only do we find amorphous quartz being made by the aid of vegetation, but we know that one of the gems is so made. Mr. Weed tells us: "Besides the deposits of siliceous sinter formed by the algous vegetation of the hot waters, extensive deposits of sinter are found on the slopes below the Hillside springs, which are due to the growth of mosses. . . . This sinter is not formed by evaporation, nor by any of the causes discussed in considering the precipitation of silica from solution, but is due to the abstraction of silica from the water by the mosses covering the surface of the basins."[2] In most of the deposit formed by the aid of mosses, as is the case of that formed by algae, no trace of the vegetation can be detected. It is possible, however, to find specimens in which the moss is shown in perfect state of preservation, others where the moss is partially decomposed, forming the beautiful moss agate. My friend, Mr. Emil Starz, prominent in Montana as a skilled chemist, accounts for the absence of plant remains in the silica formed by the aid of vegetation by suggesting that the carbon of the plant was changed to carbonic acid gas in the formation of the material. Should this view be confirmed, we can understand the origin of the liquified carbonic acid gas which Sorby informs us is one of the constituents of quartz.

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The following figures represent the shrinkages of castings of different metals: Zinc, 0.3125 in. per foot equals 2.60 per cent; lead, 0.3125 in. per ft., or 2.60 per cent; aluminum, 0.2031 in. per ft., or 1.69 per cent; copper, 0.1875 in. per ft., or 1.56 per cent; brass, 0.1580 in. per ft., or 1.32 per cent; iron pipes, 0.1250 in. per ft., or 1.04 per cent.

THE SAMPLING AND ESTIMATION OF ORE IN A MINE—IV.

BY T. A. RICKARD.

(*Continued from page 291.*)

CALCULATIONS AFTER SAMPLING.

The calculations consequent upon sampling are based on the theory of averages. An arithmetical mean is "the sum of all the numbers forming the series of figures under consideration divided by their number without reference to their weight or relative importance among themselves." This method has been applied to the results of sampling with most unhappy consequences. Thus, let the following series of figures represent the data obtained from sampling a length of 100 ft. of gold-bearing ore at intervals of 10 ft.

Width.	Assay.
3.4 feet	2.35 oz. per ton.
6.2 feet	.45 oz. per ton.
7.6 feet	.62 oz. per ton.
4.0 feet	.85 oz. per ton.
2.5 feet	1.02 oz. per ton.
3.6 feet	2.40 oz. per ton.
2.5 feet	4.25 oz. per ton.
.8 feet	5.20 oz. per ton.
1.2 feet	4.65 oz. per ton.
2.2 feet	3.21 oz. per ton.
35.0	25.00

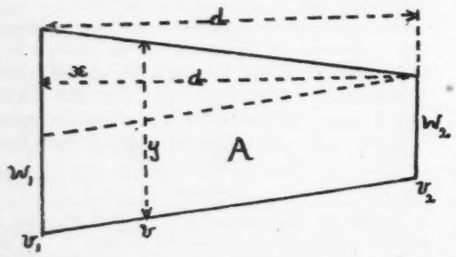
The arithmetic mean yields 3½ ft. of ore averaging 2½ oz. of gold per ton. This is woefully wrong. It disregards the fact, for instance, that the third sample yielded about 7½ ft. of ore containing only 0.6 oz. of gold while the richest ore, at the eighth sample, was less than 1 ft. wide.

The geometrical mean is "the sum of such figures divided by their number with due allowance made for their weight." This is done in practice by what many call the "foot-ounce" method, which, applied to the foregoing example, works out thus:

Width.	Assay.	Foot-ounces.
3.4 feet	2.35 oz. per ton	7.99
6.2 feet	.45 oz. per ton	2.79
7.6 feet	.62 oz. per ton	4.71
4.0 feet	.85 oz. per ton	3.40
2.5 feet	1.02 oz. per ton	2.55
3.6 feet	2.40 oz. per ton	8.64
2.5 feet	4.25 oz. per ton	10.62
.8 feet	5.20 oz. per ton	4.16
1.2 feet	4.65 oz. per ton	5.58
2.2 feet	3.21 oz. per ton	7.06
35.0	25.06	57.50

The average assay per foot of width is 1.64 oz. per ton, instead of 2½ oz. In matters of this kind mathematical reasoning confirms the conclusions of rough common sense. The method just described is based upon the higher mathematics, as the following integrations, kindly suggested by Mr. Ross Hoffman, will demonstrate:

Problem 1.—To determine the average value of the section of vein A between the samples whose widths are w_1 and w_2, and values v_1 and v_2, respectively, under the assumption that the values vary



gradually over the area from v_1 to v_2 in the direction d, then at any distance x from w_1 the value

$$v = \frac{x}{d}(v_2 - v_1) + v_1 \qquad (1)$$

also

$$\frac{d}{w_1 - w_2} = \frac{d - x}{y - w_2} \text{ or } y = \frac{x\,(w_2 - w_1)}{d} + w_1 \qquad (2$$

$$A = \frac{(w_1 + w_2)\,d}{2} \qquad (3)$$

$$\int_{x=0}^{x=d} v\,y\,dx \div A = \text{average value for the section A.}$$

From 1 and 2. $v\,y = \frac{x^2}{d^2}(w_1 v_1 + w_2 v_2) + \left(\frac{x}{d} - \frac{x^2}{d^2}\right)(w_2 v_1 + w_1 v_2) + \left(1 - \frac{2x}{d}\right) w_1 v_1$

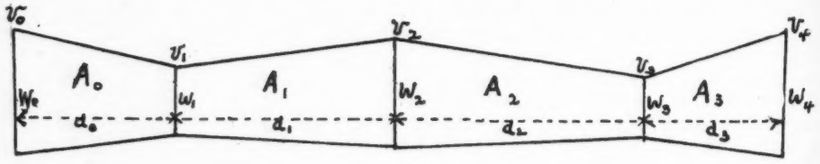
$$\therefore \frac{2}{(w_1 + w_2)\,d}\int_0^d v\,y\,dx = \tfrac{2}{3}\,\frac{w_1 v_1 + w_2 v_2}{w_1 + w_2} +$$

$$\tfrac{1}{3}\,\frac{w_2 v_1 + w_1 v_2}{w_1 + w_2} = \frac{w_1 v_1 + w_2 v_2}{w_1 + w_2} + \tfrac{1}{3}\,\frac{(w_1 - w_2)\,(v_2 - v_1)}{w_1 + w_2}$$

The last term = 0 when $w_1 = w_2$ or $v_1 = v_2$.

Under normal conditions where ordinary sampling can be depended on to give fairly approximate averages this last term will be small enough to neglect. (See by substitutions). Hence $\frac{w_1 v_1 + w_2 v_2}{w_1 + w_2}$ can be taken as the average value for section A.

Problem 2.—To find the average value from a number of samples taken as above, where w



equals width of sample, v equals value, d equals distance between samples and A, the area of various sections of vein between samples:

$A_0 = (w_0 + w_1)\frac{d_0}{2}$ average value for $A_0 = \frac{w_0 v_0 + w_1 v_1}{w_0 + w_1}$

$A_1 = (w_1 + w_2)\frac{d_1}{2}$ " " " $A_1 = \frac{w_1 v_1 + w_2 v_2}{w_1 + w_2}$

$A_2 = (w_2 + w_3)\frac{d_2}{2}$ " " " $A_2 = \frac{w_2 v_2 + w_3 v_3}{w_2 + w_3}$

$A_3 = (w_3 + w_4)\frac{d_3}{2}$ " " " $A_3 = \frac{w_3 v_3 + w_4 v_4}{w_3 + w_4}$

(See Prob. 1.)

$$\frac{\Sigma\,(A \times \text{average value for A})}{\Sigma\,A} = \text{average value over the whole area sampled} =$$

$$\frac{(w_0 v_0 + w_1 v_1)\frac{d_0}{2} + (w_1 v_1 + w_2 v_2)\frac{d_1}{2} + (w_2 v_2 + w_3 v_3)\frac{d_2}{2} + (w_3 v_3 + w_4 v_4)\frac{d_3}{2}}{\frac{w_0 (d_0)}{2} + \frac{w_1 (d_0 + d_1)}{2} + \frac{w_2 (d_1 + d_2)}{2} + \frac{w_3 (d_2 + d_3)}{2} + \frac{w_4 (d_3)}{2}}$$

$$= \frac{v_0\left\{\frac{w_0 (d_0)}{2}\right\} + v_1\left\{\frac{w_1 (d_0 + d_1)}{2}\right\} + v_2\left\{\frac{w_2 (d_1 + d_2)}{2}\right\} + v_3\left\{\frac{w_3 (d_2 + d_3)}{2}\right\} + v_4\left\{\frac{w_4 (d_3)}{2}\right\}}{\left\{\frac{w_0 (d_0)}{2}\right\} + \left\{\frac{w_1 (d_0 + d_1)}{2}\right\} + \left\{\frac{w_2 (d_1 + d_2)}{2}\right\} + \left\{\frac{w_3 (d_2 + d_3)}{2}\right\} + \left\{\frac{w_4 (d_3)}{2}\right\}}$$

The bracketed terms represent areas and may be considered the importance or weight factors with which the various sample values taken separately enter into the general average value for the whole area. It is equivalent to giving each sample value an importance (or weight) proportional to its sample width multiplied by half the sum of the distances to the two adjacent samples.

Averaging in this manner assumes as in Problem 1, that the values between various adjacent samples change gradually.

If the samples are taken equidistantly the above average becomes

$$\frac{v_0\left(\frac{w_0}{2}\right) + v_1 w_1 + v_2 w_2 + v_3 w_3 + v_4\left(\frac{w_4}{2}\right)}{\frac{w_0}{2} + w_1 + w_2 + w_3 + \frac{w_4}{2}}$$

which, with the exception of the two end samples, is simply giving each value an importance in the general average proportional to the width of its sample. The two end sample values are shown to have half this importance, though in practice, with many samples in the average, it is customary to give the two end samples the full importance proportional to their respective widths.

In the calculations for tonnage the cubic feet of ore are converted into tons on the basis of a certain specific gravity; thus, quartz is usually taken at 15 cub. ft. per ton, while ores containing sulphides are rated at 8 to 12 cub. ft. It is not unusual to guess at this proportion because experience does enable an engineer to approximate the correct figure fairly well. But it is a dangerous practice. Approximations should never suffice where greater accuracy is possible. It is well to weigh a series of measured pieces of ore or to determine actually the specific gravity of a few pieces of average vein-stuff. Surface quartz, on account of its cellular structure, may require 20 cub. ft. to weigh a ton. Pyritic ores will vary to an extent hardly appreciable even to the experienced eye. Grevious errors in tonnage estimates have been caused by the assumption of an incorrect basis of calculation.

A minor source of error is sometimes created by the occurrence in the vein of numerous cavities, or "vughs," as the miners call them. In some cases they form a very appreciable proportion of the space occupied by the lode, so that they are apt to lessen the tonnage obtainable from a block of stoping ground.

THE QUESTION OF "HIGH ASSAYS."

In these calculations, whether they be mathematical or rough-and-ready, it is assumed that where two adjoining samples vary there is a gradation from one to the other. Generally the assumption is warrantable, but occasionally the difference between any two such adjoining samples is so marked as to require further consideration. In the sampling of gold mines, especially where the metal occurs in a native condition and visible to the eye, there will be a few very high results which affect the average of a run of samples to an extent quite out of proportion to the importance of a single sample.

This question of "high assays" demands careful discussion. It can be viewed from two standpoints: the seller of a mine is apt to argue that if you are going to base an estimate of the ore-reserves upon the results of sampling and assay you ought to take all the data without favor, just as they come, and that to eliminate high assays is no more fair than it would be to omit poor ones; to this the engineer, representing the interests of a possible purchaser, will reply that the occasional very high assays are largely accidental, that they affect the estimates to a degree out of proportion to their weight, and to an extent by no means comparable to the omission of an equal number of poor results; finally, he will murmur under his breath something about a factor of safety being necessary.

In the first place, it is incumbent upon the engineer to find out whether these occasional high results do, or do not, represent the average of the ore, not at the particular place sampled only, but over the whole space or interval which that sample is supposed to represent. Each sample, in the final calculation, speaks not for a spot but for a section of the vein, the length of which is the interval between samples and the height is the distance separating it from the next working

overhead or underfoot; thus, when the distance between samples is 10 ft. and the next series of samples is on a level 100 ft. distant, above or below, then the section represented by a single sample contains 10 by 100 ft., or 1,000 sq. ft., which, if the vein be, for example, 3 ft. wide, may contain over 200 tons of ore. In practice the responsibility of one series of such samples is shared by that of a corresponding series taken on the level above or below; nevertheless, it is obvious that a single sample represents something very different to the mere spot or point in a particular working. In order to answer the question whether an individual high assay is accidental or representative, the only thing to do is to resample at the same place; if the result is confirmatory then evidently that spot is as rich as the first sampling indicated. But this does not determine whether the high values gradate on either side toward the adjoining samples. Thus, if A, B and C in the diagram represent three points, 10 ft. apart, which have been sampled with the results shown, then, if B assayed 10.40 oz. and was

re-sampled with 8.22 oz. as the assay return, the next question arising is whether the ore midway between B and A, or B and C, is correspondingly intermediate in value; for this is what the calculations assume. For this reason it is best to check the high assays by taking further samples at these intermediate places, thereby finally settling the query whether the high results are trustworthy factors in estimating the average value of the ore-bodies.

The treatment of "high assays" has caused much discussion, among engineers, especially when they are encountered in the course of a sampling, the results of which are to decide the price of a mine. The seller, or his representative, is apt to suggest that a re-sample of poor spots is also in keeping with the theory of the whole business, and to this I would say that where a barren or nearly barren result is obtained amid a series of samples indicating good ore it *is* correct to re-sample such a place or places. The occasional barren and the occasional high assay return, however, are not comparable in their effect upon the estimates. In the first place, the "nil" or "trace" indicates the entire absence of the metal and has not the accidental feature arising from the presence of a stray speck of gold, which may cause the abnormally high assay; further, one very high assay affects the calculations more than a number of poor ones, supposing both to be deviations from fact, as can be easily shown, thus: Take the following series of samples and assay returns:

Width.	Assay.	Foot-ounces.
7 feet	1.22 oz. gold	8.54
4 feet	.54 oz. gold	2.16
12 feet	1.20 oz. gold	14.40
8 feet	2.20 oz. gold	17.60
5.3 feet	27.40 oz. gold	144.22
7 feet	1.60 oz. gold	11.20
3.5 feet	.95 oz. gold	3.32
6 feet	.39 oz. gold	2.34
6 feet	trace gold	....
7.2 feet	trace gold	....
66.0	35.50	203.78

The average of the ore, using these data, is slightly over 3 oz. per ton. If, however, you eliminate the fifth sample, which is very high, the average drops to less than 1 oz. per ton, while, on the other hand, if you retain the high sample and omit the last two poor places the result is affected to a much less degree, the average then being about 3¼ oz. per ton.

In re-sampling these apparently very rich spots, it will be found that three contingencies may occur; the result may be corroborated or it may be proved to be accidental, while, should every high assay be found incorrect then there is a third possibility to be considered, namely, whether the samples have been tampered with. If out of a considerable number of high results not one is confirmed, then it is time to look around. If some are confirmed by re-sampling, while others are not, then, obviously, the values in the ore are erratic and a correction must be made for each case; if most of the high results are approximately repeated by the second sample, then it is evident that the first sampling was correct and that the ore is very rich in spots; intermediate samples must be taken, and when this is done the data for calculations will be complete. It is wise to take intermediate samples, both when the high assays are wholly, and when they are only partially, confirmed.

It has been argued by certain engineers that the mill or smelter always fails to confirm the very high assays occasionally obtained in sampling and that, therefore, they should be omitted as a factor of safety. This is not a fact. Exceptions occur. In the case of the Argentine lode of the Tomboy Mining Company, at Telluride, Colo., a careful sampling of a block of ground, at intervals of 10 ft., yielded an average of $7 per ton, all rich spots carrying visible gold being avoided. This work was done by an inspecting engineer of recognized capacity. Nevertheless, the actual mill returns were $28 per ton. Nor is this inexplicable when the nature of the ore is considered. The writer saw a piece weighing 25 lbs., yellow with finely disseminated gold, so that it contained $100 worth of the native metal, which came from the breast of a level on a certain day—and the very next day the foreman's sample from the face of the same drift, which had been advanced a few feet in the interval, yielded only *two-hundredths* of an ounce of gold per ton! The Pandora vein, in the neighboring Smuggler-Union Mine, affords another exceptional case; the mill results are usually higher than the assays, and this is explained as being due partly to the greater hardness of the rich ore, but chiefly because the gold occurs almost entirely in coarse particles which, being readily visible, are apt to be carefully shunned by the conscientious sampler. These instances are corroborated by the thoroughly experienced managers of the properties quoted. It remains to add that while it is true of the veins specifically mentioned, that the assays are usually lower than the mill returns, such is not the case with the Tomboy lode, which is near the Argentine, nor is it true of the Smuggler lode, which is intersected by the Pandora in the Smuggler-Union Mine. The above are, however, well authenticated exceptions, which serve effectually to undermine a generalization which is the last resort of a timid engineer. Not that the factor of safety is to be discarded, quite the contrary, in all engineering such a precautionary measure is imperative, but do not introduce it disguised, face the facts, state them, and then introduce your factor of safety without any circumlocution.

Why do sampling results differ from the mill returns? In the unusual instances, just mentioned, the difference was traceable to conditions which are relatively rare, but are always within the range of possibility. There is no doubt in my mind that the usual experience, of finding the mill-extraction below the estimates, based upon sampling and assay, is traceable to the fact that rich ore is ordinarily in the softer, more crumbly parts of a lode, or it is associated with sulphides which are not only easier to break than quartz, but they also make a shining mark which invites the blow of the moil and hammer. This aspect of the inquiry emphasizes the weak factor in sampling, it is not absolutely mechanical, a man and not a machine does the work, and the results partake of that liability to error which is essentially human.

It may be asked, in conclusion, what course should be adopted with high assays when it is not possible to re-sample? Frequently, the samples are not assayed near the mine, but are taken, or sent, by the engineer to a reliable assayer living in a distant locality. Time, an element in all business matters, may prevent the engineer from returning to the mine to take further samples. This is a dilemma not infrequent in current practice. Judgment and experience must decide. The relative frequency of high assays, the degree to which they affect the final estimates, the character of the ore, the results of sampling as compared to the actual recorded average of the mine, the reliability of the work done by the engineer and his assistants; these and similar factors will determine the decision. One cannot lay down rules to direct any man's judgment.

It may be permitted to say, that, if you are uncertain of your results—don't use them. Do not let yourself be hurried, either by your client or, as is more probable, by the vendor, to committing yourself to a decision based upon data, the accuracy of which, in your own mind, is in any doubt. It is better to be sure than sorry.

(To be continued.)

PRECIOUS STONES IN 1902.

A preliminary report submitted to the United States Geological Survey by Mr. G. F. Kunz, of New York, says that the year 1902 has been remarkable in the precious stone industry in America in a number of particulars, among which the following may be especially noted: The finding of a new locality for sapphires in Montana—a new creek, in the bed of which sapphires are found associated with gold, as in the Rock Creek region at Yogo Gulch, and on the Missouri near Helena; the further development of a new mine of blue sapphires in Fergus County; and the continued workings of the other two mines in the same State. Then comes the mining and development of the old beryl localities in Mitchell County, N. C., and the development of the beryl locality at Grafton, N. H. An amethyst mine has been opened in South Carolina, and two new amethyst deposits have been found in the State of Virginia. The mining of rubellite in San Diego County, Cal., continues, and a new deposit near Banner in the same region has been found. The further development of chrysoprase in Tulare County, Cal., and the discovery of a new locality in Buncombe County, N. C., are to be noted. A deposit of vesuvianite (idocrase) has been discovered in Central California. The output of turquoise from eight or more western localities continues, and it has been discovered at two localities in Alabama, the most easterly region yet known for that gem.

It has been the greatest year on record for the importation of diamonds, pearls and other precious stones. The imports, also, of topaz, both the true and the so-called Spanish, Saxon, and Scotch varieties, of coral in delicate tints of pink, and of seed pearls and pearls in ropes, are worthy of remark.

The production of precious stones in the United States during 1902 is valued as follows: Sapphire, $115,000; beryl, $4,000; emerald, $1,000; tourmaline, $15,000; peridot, $500; quartz, $12,000; smoky quartz. $2,000; rose quartz, $200; amethyst, $2,000; gold quartz, $3,000; rutilated quartz, $100; agate, $1,000; moss agate, $500; chrysoprase, $10,000; silicified wood, $7,000; rhodolite, $1,500; garnet (pyrope), $1,000; amazon stone, $500; turquoise, $130,000; chlorastrolite, $4,000; mesolite, $1,000; pyrite, $3,000; anthracite ornaments, $2,000; catlinite pipestone, $2,000.

This gives a preliminary total of $318,300 for 1902, as compared with $289,050 in 1901, and $233,170 in 1900.

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(*Continued from page 291.*)

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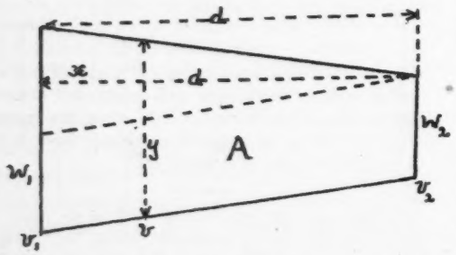

gradually over the area from v_1 to v_2 in the direction d, then at any distance x from w_1 the value

$$v = \frac{x}{d}(v_2 - v_1) + v_1 \quad (1)$$

also

$$\frac{d}{w_1 - w_2} = \frac{d - x}{y - w_2} \text{ or } y = \frac{x\,(w_2 - w_1)}{d} + w_1 \quad (2$$

$$A = \frac{(w_1 + w_2)\,d}{2} \quad (3)$$

$x = d$
$x = 0$ $\int v\,y\,dx \div A =$ average value for the section A.

From 1 and 2. $v\,y = \frac{x^2}{d^2}(w_1 v_1 + w_2 v_2) +$

$$\left(\frac{x}{d} - \frac{x^2}{d^2}\right)(w_2 v_1 + w_1 v_2) + \left(1 - \frac{2x}{d}\right) w_1 v_1$$

$$\therefore \frac{2}{(w_1 + w_2)\,d} \int_0^d v\,y\,dx = \tfrac{2}{3}\,\frac{w_1 v_1 + w_2 v_2}{w_1 + w_2} +$$

$$\tfrac{1}{3}\,\frac{w_2 v_1 + w_1 v_2}{w_1 + w_2} = \frac{w_1 v_1 + w_2 v_2}{w_1 + w_2} + \tfrac{1}{3}\,\frac{(w_1 - w_2)\,(v_2 - v_1)}{w_1 + w_2}$$

The last term = 0 when $w_1 = w_2$ or $v_1 = v_2$.

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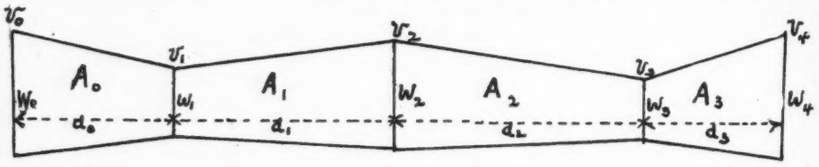

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$A_1 = (w_1 + w_2)\frac{d_1}{2}$ " " " $A_1 = \frac{w_1 v_1 + w_2 v_2}{w_1 + w_2}$

$A_2 = (w_2 + w_3)\frac{d_2}{2}$ " " " $A_2 = \frac{w_2 v_2 + w_3 v_3}{w_2 + w_3}$

$A_3 = (w_3 + w_4)\frac{d_3}{2}$ " " " $A_3 = \frac{w_3 v_3 + w_4 v_4}{w_3 + w_4}$

(See Prob. 1.)

$$\frac{\Sigma\,(A \times \text{average value for A})}{\Sigma\,A} = \text{average value over the}$$

$$\text{whole area sampled} = \frac{(w_0 v_0 + w_1 v_1)\frac{d_0}{2} +}{\frac{w_0\,(d_0)}{2} +}$$

$$\frac{(w_1 v_1 + w_2 v_2)\frac{d_1}{2} + (w_2 v_2 + w_3 v_3)\frac{d_2}{2} + (w_3 v_3 + w_4 v_4)\frac{d_3}{2}}{\frac{w_1\,(d_0 + d_1)}{2} + \frac{w_2\,(d_1 + d_2)}{2} + \frac{w_3\,(d_2 + d_3)}{2} + \frac{w_4\,(d_3)}{2}}$$

$$= \frac{v_0\left\{\frac{w_0\,(d_0)}{2}\right\} + v_1\left\{\frac{w_1\,(d_0 + d_1)}{2}\right\} + v_2\left\{\frac{w_2\,(d_1 + d_2)}{2}\right\}}{\left\{\frac{w_0\,(d_0)}{2}\right\} + \left\{\frac{w_1\,(d_0 + d_1)}{2}\right\} + \left\{\frac{w_2\,(d_1 + d_2)}{2}\right\}}$$

$$+ \frac{v_3\left\{\frac{w_3\,(d_2 + d_3)}{2}\right\} + v_4\left\{\frac{w_4\,(d_3)}{2}\right\}}{\left\{\frac{w_3\,(d_2 + d_3)}{2}\right\} + \left\{\frac{w_4\,(d_3)}{2}\right\}}$$

The bracketed terms represent areas and may be considered the importance or weight factors with which the various sample values taken separately enter into the general average value for the whole area. It is equivalent to giving each sample value an importance (or weight) proportional to its sample width multiplied by half the sum of the distances to the two adjacent samples.

Averaging in this manner assumes as in Problem 1, that the values between various adjacent samples change gradually.

If the samples are taken equidistantly the above average becomes

$$\frac{v_0\left(\frac{w_0}{2}\right) + v_1 w_1 + v_2 w_2 + v_3 w_3 + v_4\left(\frac{w_4}{2}\right)}{\frac{w_0}{2} + w_1 + w_2 + w_3 + \frac{w_4}{2}}$$

which, with the exception of the two end samples, is simply giving each value an importance in the general average proportional to the width of its sample. The two end sample values are shown to have half this importance, though in practice, with many samples in the average, it is customary to give the two end samples the full importance proportional to their respective widths.

In the calculations for tonnage the cubic feet of ore are converted into tons on the basis of a certain specific gravity; thus, quartz is usually taken at 15 cub. ft. per ton, while ores containing sulphides are rated at 8 to 12 cub. ft. It is not unusual to guess at this proportion because experience does enable an engineer to approximate the correct figure fairly well. But it is a dangerous practice. Approximations should never suffice where greater accuracy is possible. It is well to weigh a series of measured pieces of ore or to determine actually the specific gravity of a few pieces of average vein-stuff. Surface quartz, on account of its cellular structure, may require 20 cub. ft. to weigh a ton. Pyritic ores will vary to an extent hardly appreciable even to the experienced eye. Grevious errors in tonnage estimates have been caused by the assumption of an incorrect basis of calculation.

A minor source of error is sometimes created by the occurrence in the vein of numerous cavities, or "vughs," as the miners call them. In some cases they form a very appreciable proportion of the space occupied by the lode, so that they are apt to lessen the tonnage obtainable from a block of stoping ground.

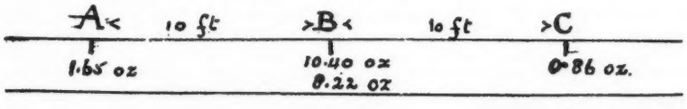
THE QUESTION OF "HIGH ASSAYS."

In these calculations, whether they be mathematical or rough-and-ready, it is assumed that where two adjoining samples vary there is a gradation from one to the other. Generally the assumption is warrantable, but occasionally the difference between any two such adjoining samples is so marked as to require further consideration. In the sampling of gold mines, especially where the metal occurs in a native condition and visible to the eye, there will be a few very high results which affect the average of a run of samples to an extent quite out of proportion to the importance of a single sample.

This question of "high assays" demands careful discussion. It can be viewed from two standpoints: the seller of a mine is apt to argue that if you are going to base an estimate of the ore-reserves upon the results of sampling and assay you ought to take all the data without favor, just as they come, and that to eliminate high assays is no more fair than it would be to omit poor ones; to this the engineer, representing the interests of a possible purchaser, will reply that the occasional very high assays are largely accidental, that they affect the estimates to a degree out of proportion to their weight, and to an extent by no means comparable to the omission of an equal number of poor results; finally, he will murmur under his breath something about a factor of safety being necessary.

In the first place, it is incumbent upon the engineer to find out whether these occasional high results do, or do not, represent the average of the ore, not at the particular place sampled only, but over the whole space or interval which that sample is supposed to represent. Each sample, in the final calculation, speaks not for a spot but for a section of the vein, the length of which is the interval between samples and the height is the distance separating it from the next working

overhead or underfoot; thus, when the distance between samples is 10 ft. and the next series of samples is on a level 100 ft. distant, above or below, then the section represented by a single sample contains 10 by 100 ft., or 1,000 sq. ft., which, if the vein be, for example, 3 ft. wide, may contain over 200 tons of ore. In practice the responsibility of one series of such samples is shared by that of a corresponding series taken on the level above or below; nevertheless, it is obvious that a single sample represents something very different to the mere spot or point in a particular working. In order to answer the question whether an individual high assay is accidental or representative, the only thing to do is to resample at the same place; if the result is confirmatory then evidently that spot is as rich as the first sampling indicated. But this does not determine whether the high values gradate on either side toward the adjoining samples. Thus, if A, B and C in the diagram represent three points, 10 ft. apart, which have been sampled with the results shown, then, if B assayed 10.40 oz. and was



re-sampled with 8.22 oz. as the assay return, the next question arising is whether the ore midway between B and A, or B and C, is correspondingly intermediate in value; for this is what the calculations assume. For this reason it is best to check the high assays by taking further samples at these intermediate places, thereby finally settling the query whether the high results are trustworthy factors in estimating the average value of the ore-bodies.

The treatment of "high assays" has caused much discussion, among engineers, especially when they are encountered in the course of a sampling, the results of which are to decide the price of a mine. The seller, or his representative, is apt to suggest that a re-sample of poor spots is also in keeping with the theory of the whole business, and to this I would say that where a barren or nearly barren result is obtained amid a series of samples indicating good ore it *is* correct to re-sample such a place or places. The occasional barren and the occasional high assay return, however, are not comparable in their effect upon the estimates. In the first place, the "nil" or "trace" indicates the entire absence of the metal and has not the accidental feature arising from the presence of a stray speck of gold, which may cause the abnormally high assay; further, one very high assay affects the calculations more than a number of poor ones, supposing both to be deviations from fact, as can be easily shown, thus: Take the following series of samples and assay returns:

Width.	Assay.	Foot-ounces.
7 feet	1.22 oz. gold	8.54
4 feet	.54 oz. gold	2.16
12 feet	1.20 oz. gold	14.40
8 feet	2.20 oz. gold	17.60
5.3 feet	27.40 oz. gold	144.22
7 feet	1.60 oz. gold	11.20
3.5 feet	.95 oz. gold	3.32
6 feet	.39 oz. gold	2.34
6 feet	trace gold	....
7.2 feet	trace gold	....
66.0	35.50	203.78

The average of the ore, using these data, is slightly over 3 oz. per ton. If, however, you eliminate the fifth sample, which is very high, the average drops to less than 1 oz. per ton, while, on the other hand, if you retain the high sample and omit the last two poor places the result is affected to a much less degree, the average then being about 3¼ oz. per ton.

In re-sampling these apparently very rich spots, it will be found that three contingencies may occur; the result may be corroborated or it may be proved to be accidental, while, should every high assay be found incorrect then there is a third possibility to be considered, namely, whether the samples have been tampered with. If out of a considerable number of high results not one is confirmed, then it is time to look around. If some are confirmed by re-sampling, while others are not, then, obviously, the values in the ore are erratic and a correction must be made for each case; if most of the high results are approximately repeated by the second sample, then it is evident that the first sampling was correct and that the ore is very rich in spots; intermediate samples must be taken, and when this is done the data for calculations will be complete. It is wise to take intermediate samples, both when the high assays are wholly, and when they are only partially, confirmed.

It has been argued by certain engineers that the mill or smelter always fails to confirm the very high assays occasionally obtained in sampling and that, therefore, they should be omitted as a factor of safety. This is not a fact. Exceptions occur. In the case of the Argentine lode of the Tomboy Mining Company, at Telluride, Colo., a careful sampling of a block of ground, at intervals of 10 ft., yielded an average of $7 per ton, all rich spots carrying visible gold being avoided. This work was done by an inspecting engineer of recognized capacity. Nevertheless, the actual mill returns were $28 per ton. Nor is this inexplicable when the nature of the ore is considered. The writer saw a piece weighing 25 lbs., yellow with finely disseminated gold, so that it contained $100 worth of the native metal, which came from the breast of a level on a certain day—and the very next day the foreman's sample from the face of the same drift, which had been advanced a few feet in the interval, yielded only *two-hundredths* of an ounce of gold per ton! The Pandora vein, in the neighboring Smuggler-Union Mine, affords another exceptional case; the mill results are usually higher than the assays, and this is explained as being due partly to the greater hardness of the rich ore, but chiefly because the gold occurs almost entirely in coarse particles which, being readily visible, are apt to be carefully shunned by the conscientious sampler. These instances are corroborated by the thoroughly experienced managers of the properties quoted. It remains to add that while it is true of the veins specifically mentioned, that the assays are usually lower than the mill returns, such is not the case with the Tomboy lode, which is near the Argentine, nor is it true of the Smuggler lode, which is intersected by the Pandora in the Smuggler-Union Mine. The above are, however, well authenticated exceptions, which serve effectually to undermine a generalization which is the last resort of a timid engineer. Not that the factor of safety is to be discarded, quite the contrary, in all engineering such a precautionary measure is imperative, but do not introduce it disguised, face the facts, state them, and then introduce your factor of safety without any circumlocution.

Why do sampling results differ from the mill returns? In the unusual instances, just mentioned, the difference was traceable to conditions which are relatively rare, but are always within the range of possibility. There is no doubt in my mind that the usual experience, of finding the mill-extraction below the estimates, based upon sampling and assay, is traceable to the fact that rich ore is ordinarily in the softer, more crumbly parts of a lode, or it is associated with sulphides which are not only easier to break than quartz, but they also make a shining mark which invites the blow of the moil and hammer. This aspect of the inquiry emphasizes the weak factor in sampling, it is not absolutely mechanical, a man and not a machine does the work, and the results partake of that liability to error which is essentially human.

It may be asked, in conclusion, what course should be adopted with high assays when it is not possible to re-sample? Frequently, the samples are not assayed near the mine, but are taken, or sent, by the engineer to a reliable assayer living in a distant locality. Time, an element in all business matters, may prevent the engineer from returning to the mine to take further samples. This is a dilemma not infrequent in current practice. Judgment and experience must decide. The relative frequency of high assays, the degree to which they affect the final estimates, the character of the ore, the results of sampling as compared to the actual recorded average of the mine, the reliability of the work done by the engineer and his assistants; these and similar factors will determine the decision. One cannot lay down rules to direct any man's judgment.

It may be permitted to say, that, if you are uncertain of your results—don't use them. Do not let yourself be hurried, either by your client or, as is more probable, by the vendor, to committing yourself to a decision based upon data, the accuracy of which, in your own mind, is in any doubt. It is better to be sure than sorry.

(*To be continued.*)

PRECIOUS STONES IN 1902.

A preliminary report submitted to the United States Geological Survey by Mr. G. F. Kunz, of New York, says that the year 1902 has been remarkable in the precious stone industry in America in a number of particulars, among which the following may be especially noted: The finding of a new locality for sapphires in Montana—a new creek, in the bed of which sapphires are found associated with gold, as in the Rock Creek region at Yogo Gulch, and on the Missouri near Helena; the further development of a new mine of blue sapphires in Fergus County; and the continued workings of the other two mines in the same State. Then comes the mining and development of the old beryl localities in Mitchell County, N. C., and the development of the beryl locality at Grafton, N. H. An amethyst mine has been opened in South Carolina, and two new amethyst deposits have been found in the State of Virginia. The mining of rubellite in San Diego County, Cal., continues, and a new deposit near Banner in the same region has been found. The further development of chrysoprase in Tulare County, Cal., and the discovery of a new locality in Buncombe County, N. C., are to be noted. A deposit of vesuvianite (idocrase) has been discovered in Central California. The output of turquoise from eight or more western localities continues, and it has been discovered at two localities in Alabama, the most easterly region yet known for that gem.

It has been the greatest year on record for the importation of diamonds, pearls and other precious stones. The imports, also, of topaz, both the true and the so-called Spanish, Saxon, and Scotch varieties, of coral in delicate tints of pink, and of seed pearls and pearls in ropes, are worthy of remark.

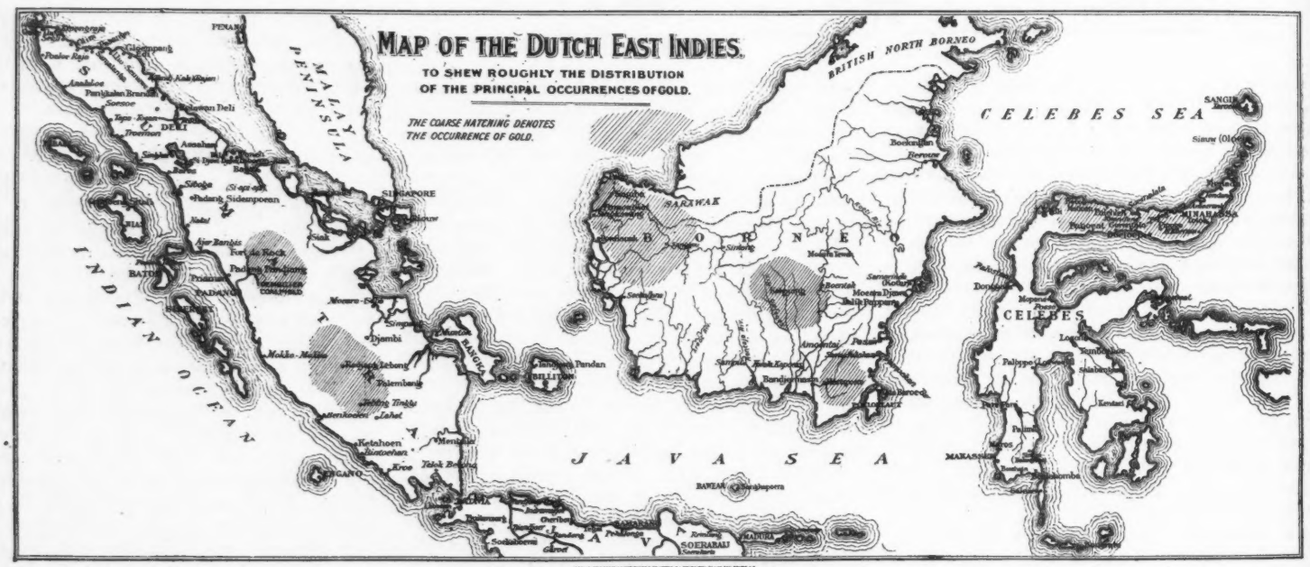
The production of precious stones in the United States during 1902 is valued as follows: Sapphire, $115,000; beryl, $4,000; emerald, $1,000; tourmaline, $15,000; peridot, $500; quartz, $12,000; smoky quartz, $2,000; rose quartz, $200; amethyst, $2,000; gold quartz, $3,000; rutilated quartz, $100; agate, $1,000; moss agate, $500; chrysoprase, $10,000; silicified wood, $7,000; rhodolite, $1,500; garnet (pyrope), $1,000; amazon stone, $500; turquoise, $130,000; chlorastrolite, $4,000; mesolite, $1,000; pyrite, $3,000; anthracite ornaments, $2,000; catlinite pipestone, $2,000.

This gives a preliminary total of $318,300 for 1902, as compared with $289,050 in 1901, and $233,170 in 1900.

GOLD MINING IN THE DUTCH EAST INDIES.

Owing to a number of recent inquiries concerning the development of gold mining in the Dutch East Indies, we take pleasure in reproducing the map of the region which appeared in the ENGINEERING AND MINING JOURNAL of October 4, 1902, together with a brief outline of the progress in mining based chiefly on the paper of S. J. Truscott, read before the Institution of Mining and Metallurgy, London, and abstracted in our issues of October 4 and 11, 1902.

The mining industry of the Dutch East Indies, while full of promise, has so far resulted in great loss to European investors. Between 1893 and 1901, inclusive, 53 gold mining companies have been organized, with an aggregate capitalization of approximately $12,500,000, of which $10,800,000 of bonds have been subscribed, and more than $2,500,000 has been expended in exploration work alone, not including the cost of exploitation of mines which had already reached the productive stage. Of the latter only three companies can be enumerated: The Nederlandsch-indische, the Totok and the Redjang Labong companies, and even with these the ore so far produced by them has not been of sufficient value to warrant the payment of dividends. In addition to the three producing companies mentioned above, others are reported to be actively engaged in exploitation work, notably the Kahajan Company, operating a mill at Dajak; the Alluvia Company, which is dredging at Sambas and the Loemar Mining Company, which is running a mill and conducting sluice mining in addition. Despite the discouraging results which have attended the early development of gold mining, it is the opinion of many engineers that a series of mines will be developed in the Redjang Labong District, which will become in time a prominent factor in the world's production of this precious metal.



The report of the Nederlandsch-indische Company for the year 1901 states that 15,618 tons of ore of an average of 18.6 grams gold per metric ton were treated by amalgamation on copper plates and concentration by blanket tables and Frue vanners. The product obtained was 193.7 kg. crude gold, equivalent to 143.5 kg. free gold, valued approximately at $95,000, which shows an extraction by amalgamation of 49.4 per cent, and from the concentrates of 12.4 per cent, making a total of only 61.8 per cent. This low extraction throws a doubt upon the applicability of the present method of treatment. For the first nine months of 1902 this company stamped 17,655 metric tons of ore, which yielded 168 kg. crude bullion containing 118 kg. pure gold and 43 kg. pure silver.

The Totok Company in Celebes stamped 4.657 metric tons from January to August 15, 1901, yielding on the average 7.1 grams gold per ton, an extraction of only 55 per cent. On account of this low return the stamp mill was closed down in September, 1901, until the completion of the cyanide plant by which an increased yield will be obtained.

The Redjang Labong Company in Southern Sumatra during 1901 stamped 29,734 metric tons of ore and obtained by combined amalgamation and cyanide processes 20,755 oz. gold and 121,400 oz. silver, representing an average extraction of 0.7 oz. gold and 4 oz. silver per ton of ore—in addition 10,435 tons of battery sluices of an estimated value of $319,400 were reserved for future treatment so that the total value of the 29,734 tons of ore treated represented $806,400. The operating expenses per month amounted to $28,000. High dividends from this company are promised in the near future, despite the heavy cost of transportation to the mine, which lies deep in the interior of the island.

The chief points of the development of gold mining in the Dutch East Indies are briefly summarized as follows:

Sumatra.—Gold mining centers around the Redjang Lebong Mine in the southwest part of the island. The reef has a known extent of 1,000 ft. in length and 17 ft. in width, assaying 2 oz. gold and from 7 to 10 oz. silver per ton. The general run of the ore is a hard, close-grained, amorphous silica, with very little crystalline quartz, accompanied by a breccia of black silicified slate and calcspar. The gold occurs so finely disseminated that it is rarely visible even under a microscope. Apparently it exists as free gold in the richer seams and elsewhere as an alloy of gold and silver in the proportion of one of gold to ten of silver. An analysis of bullion from this mine is remarkable for the quantity of selenium present.

A similar gold-bearing reef occurs at the Labong Soelit Mine, five miles west of the Redjang Lebong Mine. The reef extends 2,000 ft. in length, and averages 8 ft. in width. The ore has all the characteristics of that of the Redjang Labong Mine, and assays about 1 oz. gold per ton. A third discovery of similar ore is reported 7 miles due west from the Lebong Soelit Mine. These three mines together form a great district of great prospective value.

Toward the center of the island, areas near Fort de Kock and Soepajang have been prospected, but no reef of value has as yet been reported.

Borneo.—In West Borneo, near Samhas, the Chinese have operated extensively upon alluvial and detrital deposits, but exploratory work has so far failed to discover payable ore deposits. The gold occurs in veins or vein-like impregnations in the old slates and eruptive rocks. There are, however, no large lodes, and those that were found showed little persistency in depth, as exemplified in the Loemar concession in eruptive rock and the Benkajang concession in the old slates.

In Sarawak are large areas of alluvial ground, which are rich as compared with the general average of alluvial deposits in other countries, and it is within the range of possibility that these deposits will ultimately be operated with profit. These areas usually contain much water so that the work will have to be done by dredges and, on account of the difficulties of transport and communication, the exploitation will necessarily be attended with difficulty. In this section of the island is a noteworthy occurrence of antimony sulphide containing gold.

In Southern Borneo the principal work has been confined to the Kahajang Mine, 7 miles from the Kahajang River, where two parallel reefs are being worked. The gold occurs in quartz veins in granite. The easterly reef is about 3.5 ft. wide, and averages in value 1 oz. gold and 12 oz. silver per ton. The greater part of the gold is coarse and free. The sulphides, varying from 0.5 per cent near the surface to 4.5 per cent underground, consist chiefly of iron pyrites and a small portion of copper pyrites, and assay about 1.5 oz. gold per ton. The second reef exceeds 1 ft. in width, and averages more than 5 oz. gold per ton. The proportion of sulphides present is higher than in the eastern reef, though their value apart from the free gold content is about the same. Gold occurs also at two other localities near this mine, one being of detrital gold upon granite, a mile and a half from the mine, where many old pits have been sunk by the natives to the top of the bedrock, which is similar to the granite occurring at the Kahajang Mine, and the second 5 or 6 miles to the eastward where a quartz reef 8 ft. wide and assaying about 0.5 oz. gold per ton, occurs in a slate. The formation is similar to that of the Kahajang mine, which consists of gold quartz veins near the junction of slate and granite. This property has not yet been exploited, but its value has been recognized. Alluvial gold is widely distributed in this district, and in every case its origin can be traced to an igneous rock, sometimes found as dikes and sometimes in mass. The river beds contain gold which has been loosened as the rock has become disintegrated, and for many years the natives have worked these deposits. It is probable that dredging the river beds would be profitable. In southeastern Borneo alluvial gold occurs to a small extent.

Celebes.—The northern arm of this irregularly shaped island is gold-bearing, and has been worked by the natives for many years. At the Palehleh Mine the ore is crushed coarsely by a crude pestle and finely ground in water by a stone rubber on a stone plate. The resultant paste is washed in wooden dishes, leaving only the sulphides and the free gold. The latter is separated and the sulphides are ground and washed repeatedly until used up. The maximum treatment of the sulphides is limited to seven times. The Palehleh Mine is operated by the Neder-

landsch-indische Gold Mining Company. In the principal workings the size of the reef, including all stringers which are profitable to work, varies from 1 to 20 ft., averaging about 6 ft. If the sulphides could be mined separately the ore would contain about 60 per cent of concentrates, and would average 4.5 oz. gold, 12 oz. silver per ton, with 8.5 per cent lead, 1.5 per cent copper and 3.5 per cent zinc. South of the Palehleh Mine, near the southern coast of the upper arm of Celebes, is the Pagoeat concession, covering a body of porphyrite which contains small stringers of sulphide carrying gold. In this locality occur slates containing sulphides, the copper of which has been the object of considerable development work.

On the coast 40 miles west of Palehleh is the Soemalata Mine, where the ore consists almost entirely of heavy sulphides, the lode traversing a hard and compact porphyrite. The lump ore, after removal of waste, assays about 1.5 oz. gold per ton, and the fines average 0.75 oz. per ton. The value of the latter is raised by further sorting. The Soemalata Company began operations at the mine in July, 1900, and produced 3,523 oz. gold for the balance of the year, 1900. During 1901 its output was 8,460 oz. gold, and for eleven months of 1902 it was 5,430 oz. gold. Ten miles west of Soemalata, at Denerki Bay, on the Monano concession, is a reef which consists sometimes of brecciated porphyrite rock in a siliceous cement and sometimes of more solid quartz binding the fragments within an older fracture. The ore contains about 20 per cent of sulphides with low values of gold and silver.

Prospecting work has been carried on to the eastward above this coast, notably on the Balang concession.

On the southern coast of this peninsula the Totok Mine is remarkable for the occurrence of blocks of quartz embedded in tough clay in a limestone rock overlying an altered andesite. The gold occurs in leaf form between the larger crystals or as moss or wire upon groups of smaller crystals. There is a marked scarcity of sulphides.

Six miles southwest of Totok is the Kotaboenon mining camp, where the gold occurs associated with stringers and impregnations of quartz and of sulphides in a decomposed andesite. Prospecting work has also been carried on at Bone, Pinego and Pagoejaman. Near the town of Gorontalo are deposits of copper-bearing pyrites now under development.

EFFECT OF TITANIUM ON STEEL.

In a paper recently read before the American Institute of Mining Engineers on the "Metallurgy of Titanium," Mr. Auguste J. Rossi says: "Our tests with steel have so far been limited to crucible steels, and enough has been observed to show that the influence of titanium, introduced in steel in the metallic state, has been to increase considerably the ductility, as proved by the remarkable elongation, contraction of area and limit of elasticity observed in high carbon steels containing 1.25 per cent and even 2 per cent carbon. The quantity of titanium found in the steel by analysis varied from 0.89 per cent and 1.01 per cent to 0.10 per cent. As the effect of even such small quantities as the latter one (0.10 per cent) was very marked, and as, in these cases, 0.10 per cent did not represent what could have been expected from the addition of the alloy, the question arises: Has not titanium an indirect action, when thus added to steel, besides a specific one?

"It has been suggested that in the same manner as manganese removes oxygen from steel in the bessemer process, as also in the open-hearth and even in crucible steel, titanium may not only act as a deoxidizing agent, much more powerful still than manganese, but also as removing from the steel the nitrogen it undoubtedly contains, and which has an unfavorable influence on its strength. The odor of ammonia so noticeable in the open-hearth process proves the presence of nitrogen very decidedly. As is well known, titanium burns in nitrogen at 800° C. with incandescence, just as iron burns in oxygen. If so, the use of the alloy, even when containing carbon, would be well indicated in the open-hearth as also in the converter, since it could be used as a recarburizer, on account of the high percentage of carbon it contains; as a deoxidizer (with or without ferro-manganese); and as a denitrogenizer, so to speak; and, in the case of small converters for steel castings, the heat of formation of titanic acid, which is much higher than that of silica, would prove of advantage in raising the temperature of the bath even were but a small percentage of titanium to remain ultimately in the finished product. If by such use open-hearth and converter steel could be so improved as to compare better as to strength with crucible steels, and the latter be also improved to the extent it appears to have been in our first tests, there would be opened for these alloys a large field of usefulness, and for titaniferous iron ores a very important application."

THE DISTRIBUTION OF PIG IRON PRODUCTION.

The *Iron Trade Review*, of Cleveland, has prepared, from the figures of the American Iron and Steel Association, an interesting table, showing the percentage of the total pig iron output made in each State for 1902 past, compared with that for 1900 and 1890. The figures are as follows:

	1890.	1900.	1902.
Maine	0.0	...	...
Massachusetts	0.1	0.0	0.0
Connecticut	0.2	0.1	0.1
New York	3.6	2.1	2.3
New Jersey	1.7	1.2	1.1
Pennsylvania	48.0	46.2	45.5
Maryland	1.6	2.1	1.7
Virginia	3.2	3.6	3.0
North Carolina and Georgia	0.3	0.2	0.2
Alabama	8.9	8.6	8.3
Texas	0.1	0.1	0.0
West Virginia	1.4	1.2	1.0
Kentucky	0.5	0.5	0.6
Tennessee	2.9	2.6	2.2
Ohio	13.5	17.9	20.4
Indiana	0.2	...	...
Illinois	7.6	9.9	9.7
Michigan	2.5	1.2	0.9
Wisconsin and Minnesota	2.4	1.3	1.5
Missouri	1.0	1.1	
Colorado	0.2	...	1.5
Oregon and Washington	0.1		
Total	100.0	100.0	100.0

The output of the two chief States—Pennsylvania and Ohio—is further given by districts, as follows:

	1890.	1900.	1902.
Pennsylvania:			
Lehigh Valley	7.9	4.0	2.9
Schuylkill Valley	5.9	3.2	2.9
Upper Susquehanna Valley	2.0	1.0	0.0
Lower Susquehanna Valley	5.5	3.9	3.0
Juniata Valley	2.1	0.9	1.1
Shenango Valley	6.5	5.8	7.0
Allegheny County	14.5	22.6	23.9
Miscellaneous Bituminous	3.4	4.7	4.7
Charcoal	0.2	...	...
Total Pennslyvania	48.0	46.2	45.5
Ohio:			
Hanging Rock Bituminous	1.0	1.8	1.8
Mahoning Valley	5.4	7.3	8.1
Hocking Valley	0.9	0.4	0.2
Lake Counties	...	3.6	4.8
Miscellaneous Bituminous	6.0	4.8	5.4
Hanging Rock Charcoal	0.3	0.1	0.1
Total Ohio	13.5	17.9	20.4

On the changes shown the *Review* comments as follows: "It is somewhat surprising to note that much of the movement of the decade from 1890 to 1900 has been almost reproduced in the short space of two years. It is not a result which would have been expected on purely theoretical grounds. Last year was one which kept in operation furnaces located in districts, which only figure in abnormal times. When the next depression strikes the trade we may expect radical changes to be shown up by our method of comparison. But for the present we would hardly expect that the State of Virginia, for example, should produce a smaller percentage of the total production in 1902 than in 1900, or even in 1890, but such is found to be the fact. And we find the same movement with West Virginia, Tennessee and New Jersey. Every one of these States produced more pig iron in 1902 than in either 1900 or 1890, and their relative decline is shown up only by a comparison of percentages.

"Interest will, of course, center on the large iron States. We find that the great State of Pennsylvania, which made 48.0 per cent of the country's pig iron production in 1890, and declined to 46.2 per cent in 1900, experienced a further drop to 45.5 per cent in 1902. Looking at the districts, however, the decline is easily located in the eastern part of the State. The upper Susquehanna Valley has about dropped out, while the lower has kept about even as to tonnage. The Lehigh, Schuylkill and Juniata valleys have slightly decreased their actual tonnage, and greatly decreased their proportion.

"Against these declines in the eastern part of Pennsylvania, there have been almost proportionately large advances in the western part, using Lake ores entirely. Allegheny County, which made 14.5 per cent of the country's production in 1890, made 23.9 per cent in 1902. The tonnage was more than tripled in 12 years, while the country scarcely doubled its tonnage. The Shenango Valley increased its relative importance in the same period, in less degree.

"In Ohio, the Mahoning Valley and the Lake counties increased their relative proportion in a substantial way, and made the whole State more important relatively.

"Alabama, which has shown an increasing pig iron production, lost slightly in relative importance from 1890 to 1900, and lost as much more in the two following years. In 1890 the State made 8.9 per cent of the country's production, in 1900, 8.6 per cent, and in 1892, 8.3 per cent.

"Broadly speaking, practically every item in our table indicates (1) that the districts using Lake Superior ores are increasing their relative importance in a most marked manner, the change being noteworthy in so short a period of comparison as two years; (2) the districts using local ores are either only holding their own as to actual tonnage or are declining. It requires no prophetic eye to read from this record, based on exceptionally prosperous years, that these latter districts will not so well stand the strain of adversity.

"From 1900 to 1902 the following districts showed increases in actual tonnage: Connecticut, New York, Schuylkill Valley, Juniata Valley, Shenango County, Allegheny County, Maryland, Virginia, North Carolina and Georgia, Alabama, West Virginia, Kentucky, Tennessee, Hanging Rock (Ohio), Mahoning Valley, Lake counties (Ohio), Illinois, Wisconsin and Minnesota and Missouri, Colorado, Oregon and Washington. Of these 19 there were only 10 which showed an advance in relative production, the important ones being the Mahoning Valley and the Lake counties in Ohio, and the Shenango Valley and Allegheny County in Pennsylvania.

"From 1900 to 1902 the following districts showed declines in tonnage of production: Lehigh Valley, Upper and Lower Susquehanna valleys, Texas, Hocking Valley and Michigan.

"The Upper Susquehanna Valley practically dropped out in 1902, through the removal of the local interest to Buffalo, N. Y."

BRITISH IRON ORE IMPORTS.—Imports of iron ore into Great Britain in January were, in long tons:

	1902.	1903	Changes.
From Spain	417,359	503,133	I. 85,774
From other countries	45,422	108,870	I. 63,448
Totals	462,781	612,003	I. 149,222

The other countries include Greece, Algeria, Sweden and Norway.

PORTAGE LAKE SHIP CANAL.—The Portage Lake Canal is used by a large number of vessels engaged in the Lake Superior trade. The report of Capt. D. D. Gallard, United States Engineers, in charge of the canal, shows that during the year 1902 there were 4,631 vessels passed through the canal, carrying 2,532,323 tons of freight; increases of 710 vessels and 415,699 tons of freight over 1901. The mineral freight included in the total was: Anthracite coal, 70,011 tons; bituminous coal, 998,274; iron ore, 193,536; pig and manufactured iron, 22,892; copper, 87,055; limestone, 53,984; building stone, 34,901 tons; salt, 141,711 barrels.

THE HEAD FRAMES OF SHAFTS AT CRIPPLE CREEK.

By ALEXANDER FORSYTH.

In the Cripple Creek District one is impressed with the variation in design, and evidently in cost, of the so-called "gallows frames." This difference is clearly not proportionate to the hoisting requirements.

The problem before the engineer is to construct (1) a firm and strong support for the sheaves carrying the cables from the buckets or cages to the hoisting engine, (2) to provide for the convenient discharge and loading of buckets or cages, (3) to provide for their guidance while in motion, (4) to support separate sheaves for lowering or hoisting in the manway compartment, (5) to fit the design to special surrounding conditions, (6) to make the structure durable, (7) to reduce the cost as much as is consistent with satisfying the other requirements. The discussion is limited to frames for vertical shafts, as the writer is not aware of any important inclined shafts in the Cripple Creek District.

1. In order to produce a firm and strong support for the sheaves, the frame must resist the pressure due to the weight of the load as distributed along the inclined and vertical portions of the cable, and it must resist tendencies to twist, rack and spring, occurring either while the load is in motion or when it is at rest.

The resultant of the weight of the load into the vertical and inclined portions of the cable obviously tends to tip the frame *toward* the engine. This tendency is met by placing braces, characteristic of all the frames here described, from near the top of the frame to a point somewhere between the shaft and the engine. The question at once arises, What is the proper position for these braces with reference to the angle between the inclined and vertical portions of the cable?

In the Cripple Creek region the braces may be observed to occupy all positions between that of a bisector of the angle and that of a line parallel to the inclined side. The resultant force due to the load plainly bisects this angle. Now, if the brace bisects the same angle, it takes the whole of this resultant. If the resultant comes between the brace and the vertical portions of the frame, part of the resultant is borne by the brace and part by the vertical portion. This the writer regards as the porper design. And the brace should come well back toward a position parallel to the inclined part of the cable. The weight of the sheaves and upper part of the frame and the lean of the braces all produce strain upon the rear posts, but not enough to relieve them from bearing a proper share of the load-resultant. In some frames, as, for example, in those of the four-post-derrick type, Figs. 9 and 10, the rear posts, as well as the braces, are set at a batter toward the engine. In this way the load-resultant is distributed properly between the brace and the post with the use of a shorter brace and sill, though with a longer post than would be necessary in the case of a vertical rear post.

To illustrate the above, let A B C, Fig. 1, be the given cable angle; B O, the load-resultant; D E, the position of brace parallel to cable A B; F E, a vertical rear post; H E, an inclined rear post, and K E, the position of the brace to suit the use of an inclined rear post. Frequently, as in the diagram and Figs. 2, 3, 8, 9 and 10, the point E, which is the point of junction of rear post and brace, does not come into the line of the load-resultant on account of the position of the sheave. In this case there is a turning tendency which may be regarded as occurring about the point E. This turning tendency is met in four post frames, Figs. 9 and 10, by the forward posts; in the diagram, R S for a vertical post, and R T for an inclined post and also by the stiffness of the frame; in the two-post frames it is opposed by the stiffness of the frame alone. Thus, in designing a frame, braces and sheaves must be so placed as to give to braces and posts each its share of the load-resultant. Sheaves should be placed so as to equalize twisting tendencies as far as possible and to give each side of the frame an equal strain.

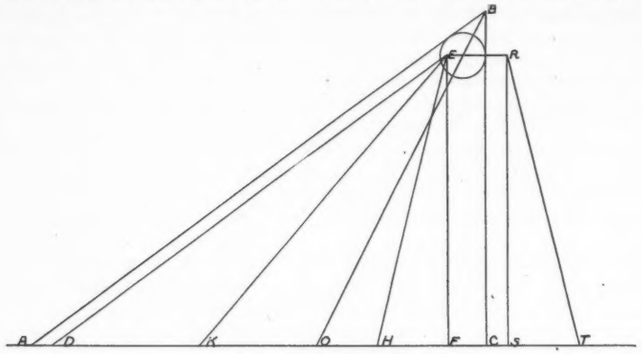


FIG. 1.—DIAGRAM OF LOAD DISTRIBUTION.

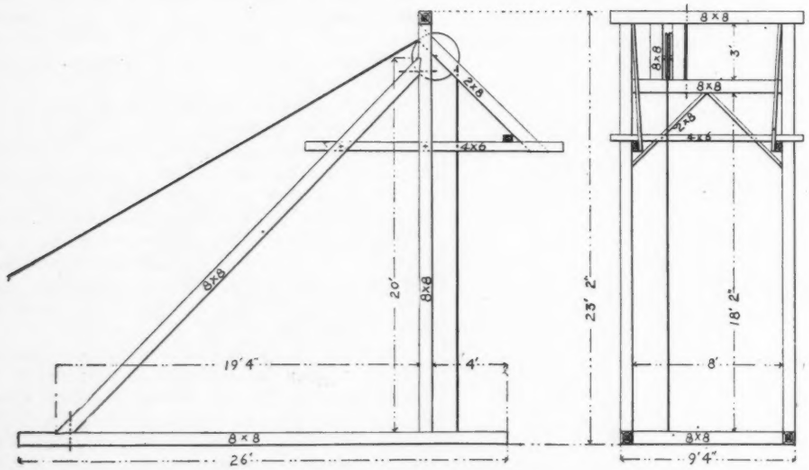
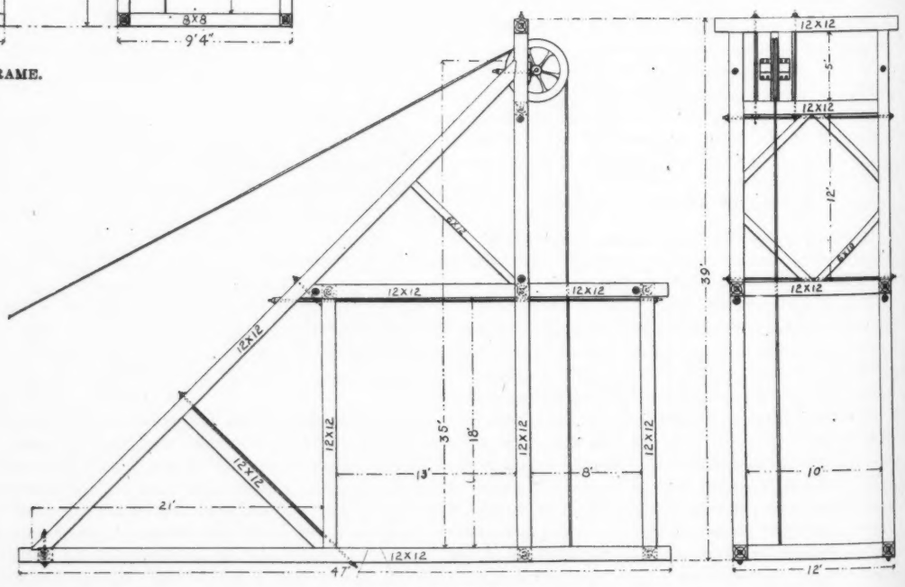


FIG. 2.—SMALL TWO-POST FRAME.

Almost without exception in the smaller Cripple Creek frames (Figs. 2 and 3), and in many of the larger ones (Figs. 4, 5, 7 and 10), the sheaves are placed nearer one side than the other, thus all the members of one side are subjected to more strain than those of the other, and the whole frame suffers more torsion than if the sheaves were placed symmetrically with reference to the sides. The writer has observed only two or three frames of the type represented by Figs. 2 and 3, with sheaves mounted in the centers. The purpose in mounting sheaves on the side seems to be to fit the small frames conveniently over the two-compartment shafts. In these small shafts a sheave is rarely used for hoisting in the ladder compartment. In larger frames (Figs. 4, 5, 7 and 10) the main hoisting sheaves are placed on one side to allow space for a pipe compartment sheave.

Besides strains, due to the load-resultant, a frame is subject to complex racking and springing from the moving load and must be proof against such accidents as catching of the cage in the shaft. There are swaying tendencies, lengthways and sideways, which are resisted by the main braces and batter of the posts, while special braces are sometimes employed to resist side swaying as in the Elkton design, Fig. 6.


12x12
12x12
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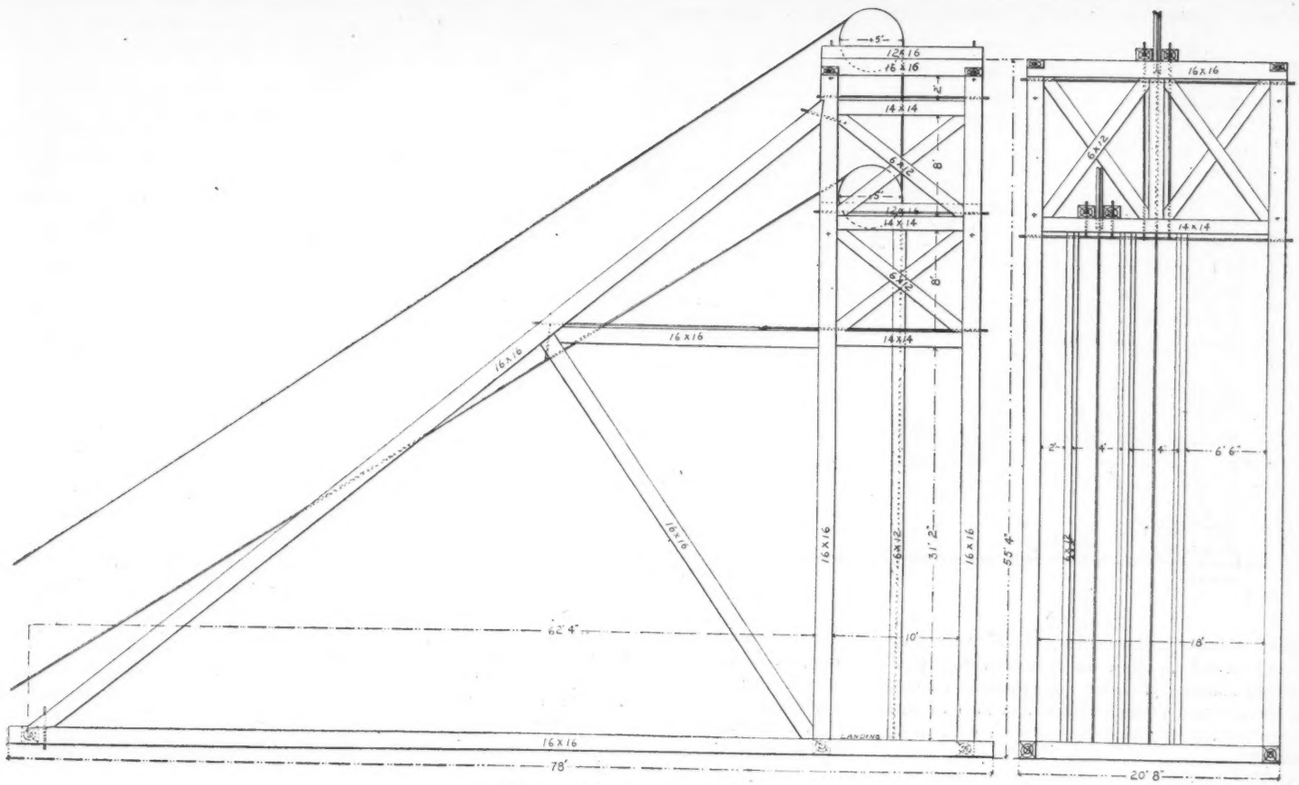


FIG. 4.—ANCHORIA-LELAND FRAME.

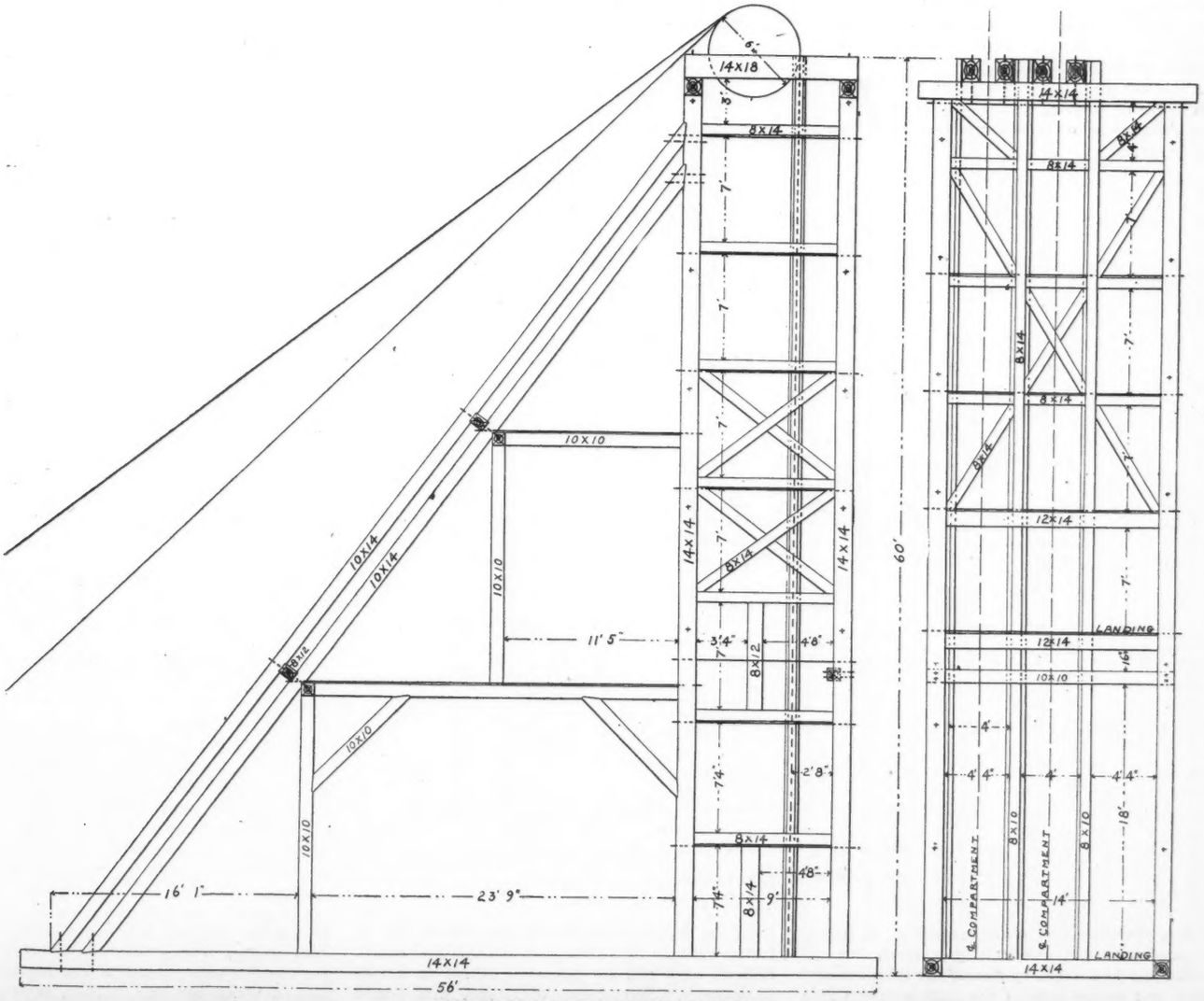


FIG. 5.—FRAME AT PORTLAND SHAFT NO. 2.

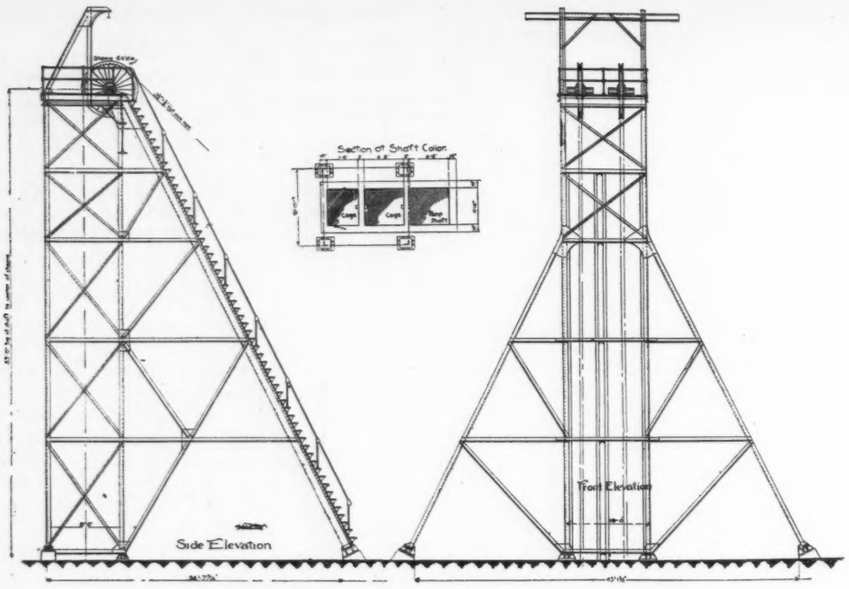


FIG. 6.—ELKTON IRON FRAME.

cages. It needs little comment. The sheave should be high enough to allow for overhoisting as well as ordinary landing; provision must be made for dumping devices and landing chairs, and also to permit of the loading of unwieldly material, such as long timbers.

3. The attachments of guides needs special attention in the case of frames of the derrick type (Figs. 9 and 10), where, owing to the double batter of the posts, the means of connecting the main frame with the guides is not so simple as in the case of vertical or single batter post frames.

4. The subject of special sheaves has been touched upon above in referring to the fact that they sometimes are allowed to throw the position of the main hoisting sheaves out of proper symmetry. In frames of the derrick and side-batter-post types, this objection may be avoided by placing the special sheave below and to one side of the main sheave within the space allowed by the batter of the posts. Vertical post frames are not wide enough to allow for a special side sheave and at the same time permit a symmetrical position for the main sheaves.

5. Surrounding conditions have strongly influenced the design of the New El Paso frame, Fig. 7. In this case the rear portions of the sills pass over a railroad track and are supported behind on a wall of masonry. Surrounding conditions, with regard to ore-house and dump, influence the height of frames and decide whether there shall be a landing at a higher level than that of the collar of the shaft.

6. Durability is to be considered in connection with the destructive yielding of members, but principally with reference to combustibilty. Here comes in the consideration of steel versus wood. The only two steel frames in the Cripple Creek District are the Elkton (Fig. 6) and the Independence Consolidated (Fig. 8). The main argument in favor of them is non-combustibility, but in the case of the Elkton this argument is not entirely valid because the steel frame is covered by a wooden shaft house. The principal arguments against the use of steel are the liability to corrosion, from the action of the vapor arising from the shaft, and the greater initial cost.

7. This consideration of cost must, of course, influence all features of the design as well as the selection of material. In general it may be observed that more material than is necessary is used. In some frames members might have been cut out with no detriment to usefulness, as, for example, the girth between the main braces in Fig. 5.

The following table gives approximately the total feet, board measure, of lumber required for the wooden frames illustrated. Timber over 12 ins. in breadth or thickness is regarded as *special* and has been entered in a separate column.

In examination of the table, note should be taken of the proportion of *special* to *ordinary* lumber, also of the total lumber and the height of the frame. In the lumber estimate, guides and guide-timbers have been omitted, since, in the case of one frame (Stratton's Independence, Limited, Fig. 10), an old frame, around which the new is built, serves to support

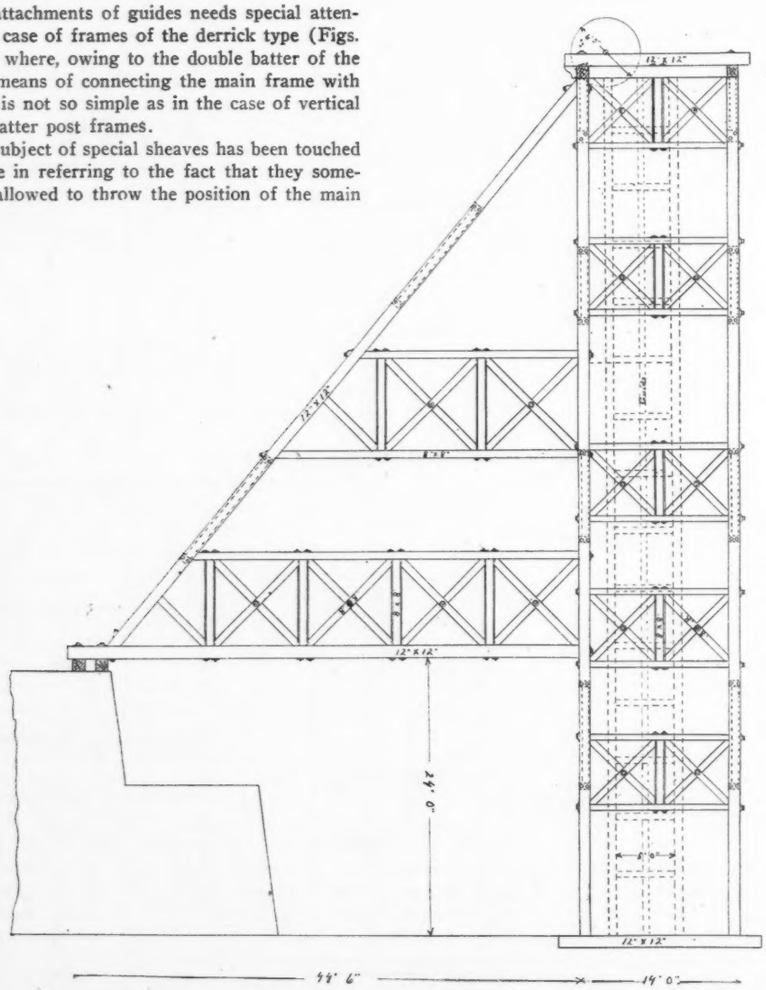
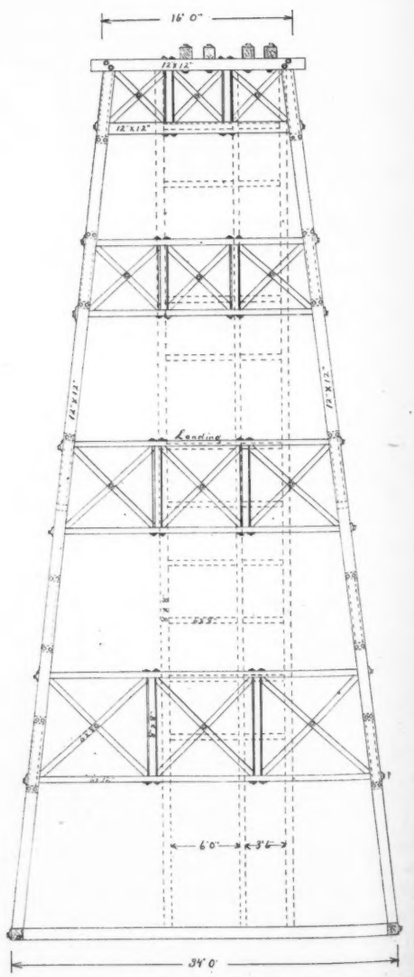


FIG. 7.—NEW EL PASO FRAME.



NEW EL PASO FRAME.

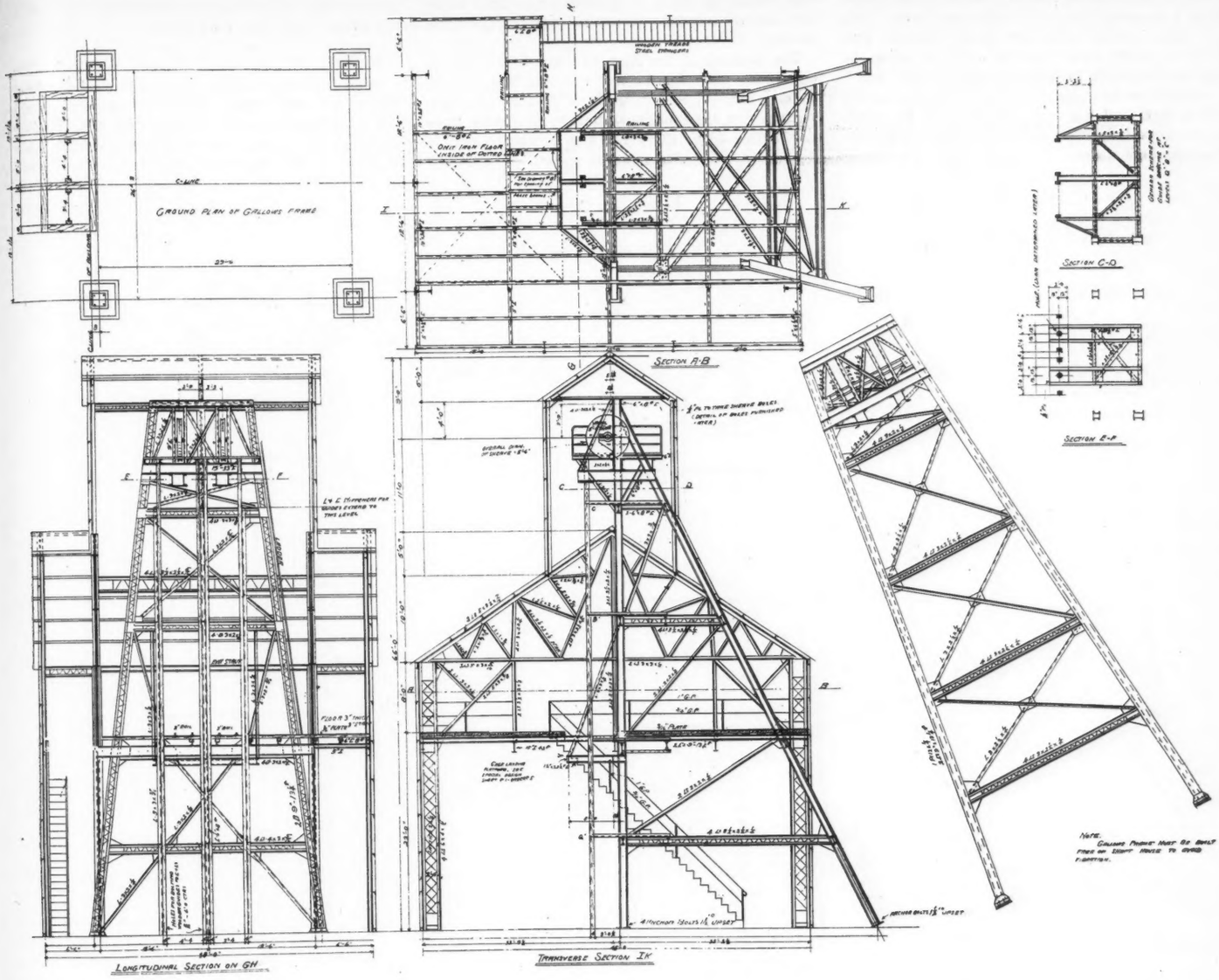


FIG. 8.—IRON FRAME OF INDEPENDENCE CONSOLIDATED.

guides, and the lumber of the old frame could not, of course, be fairly admitted in the table.

Figure.	Name.	Feet B. M. of sizes over 12 x 12.	Feet B. M. of sizes under and including 12 x 12.	Total feet B. M.	Height in feet.
2	Small Two-Post	.....	1,190	1,190	23
3	Mint	.....	6,752	6,752	39
4	Anchoria-Leland	19,294	1,248	20,542	55
5	Portland No. 2	15,796	1,786	17,582	60
7	New El Paso	.....	20,857	20,857	76
9	Gold Coin	18,164	4,928	23,092	66
10	Stratton's Ind'p'nd'nce	14,221	7,702	21,923	53

From this table, Fig. 11 has been prepared, to show the relation between height and total lumber required. From this diagram not only the relations between lumber and height in individual frames, but also a fair general relation between these factors, may be deduced.

Notes on the Illustrations.—The small two-post frame, Fig. 2, is a typical frame for prospecting shafts up to about 300 ft. in depth. It is simple in construction, and serviceable. It is usually mortised, but may be simply toe-nailed. The writer has seen one with no mortises in it doing good service.

Fig. 3 is a large two-post frame. In one sense it may be regarded as four-post, but the front posts do not go to the top, though they serve to support firmly the cross timber for the bucket dumping chain. The main batter braces are well stiffened. In some

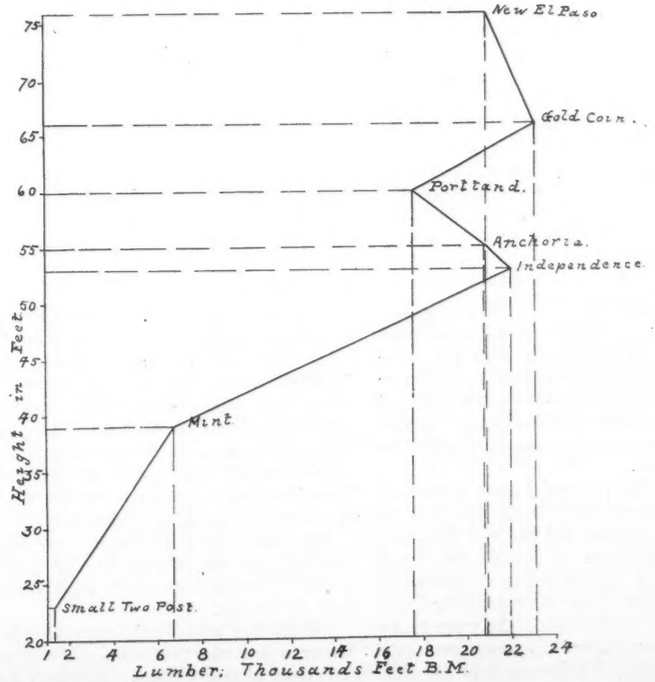


FIG. 11.—HEIGHT LUMBER CURVE.

frames of this type the posts are set on a side batter.

Fig. 4 is one of the vertical four-post type. This is a simple design with very large timbers. One sheave is placed lower than the other to allow the underwinding cable to clear the engine-shaft, which is situated in front of the drums. There is one landing level and this is at the collar of the shaft. The frame is quite high enough to allow of the use of double-deck cages.

steel frames is twice, or possibly more than twice, the cost of wooden frames to perform the same service.

The drawing of the New El Paso frame, Fig. 7, was kindly made for the writer by the designer and builder, Mr. A. A. Rummel. This frame is a departure from the traditional practice of putting large size lumber (over 12 by 12) into a high frame. It is about to be put to a working test. It is of the

sketches and for furnishing blue-prints from which the writer's drawings were made.

STEEL HEAD-FRAMES IN WALES.—The London *Colliery Guardian* says that steel pit head frames are now being erected at several South Wales collieries—one 70 ft. high for the Windsor Colliery, Abertridwr; one of 52 ft. at Ferndale; one of 50 ft. at the Mountain Colliery, Gorseinon; and

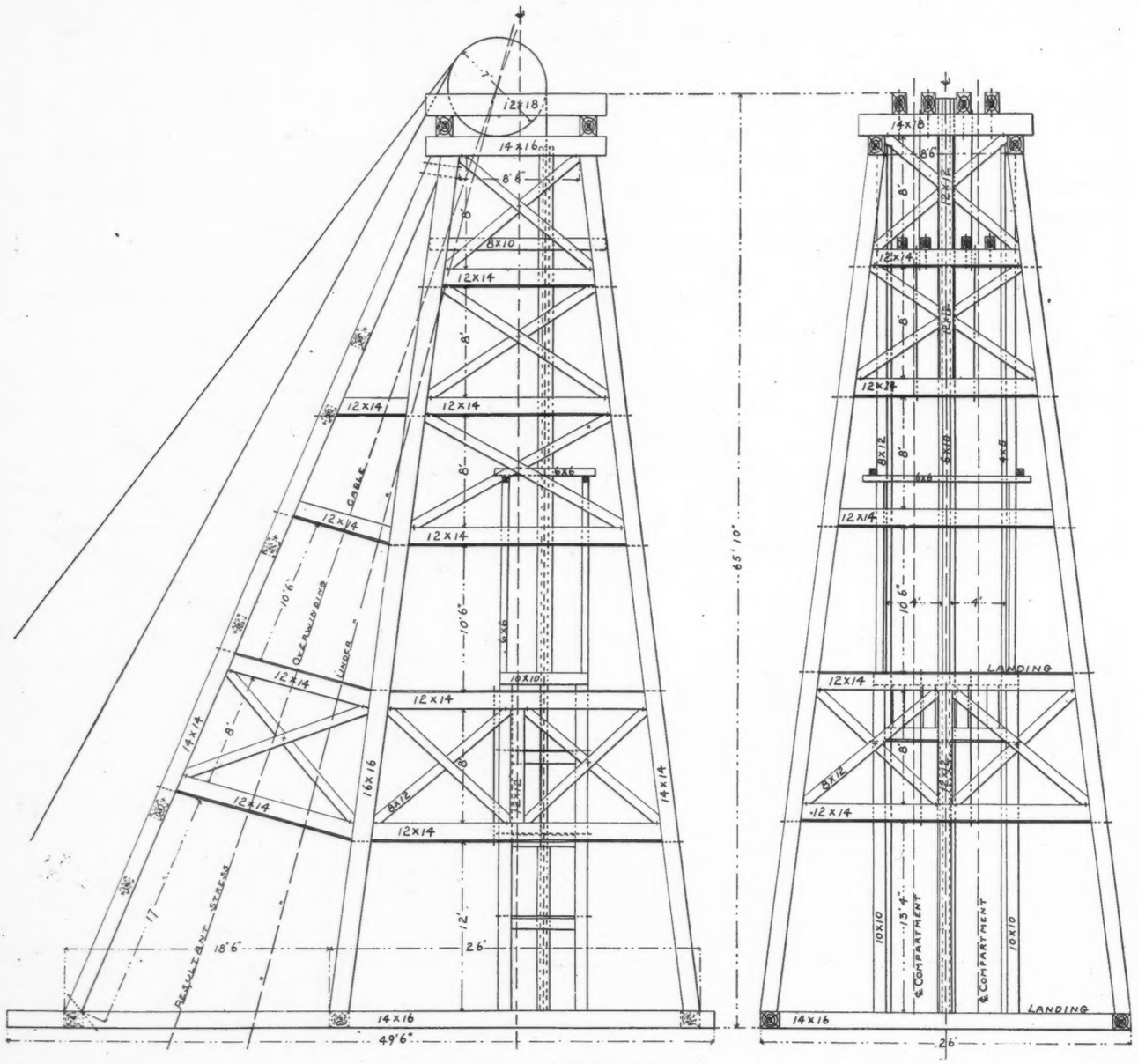


FIG. 9.—GOLD COIN FRAME.

Fig. 5 (the Portland Shaft No. 2) differs greatly in bracing from Fig. 4, though of the same four-vertical-post type. Probably more trips are made per shift and as much hoisting tonnage on this frame as on any in the district. It has some forward and back sway, but very little side movement. Three-ton skips are soon to be substituted for the double-deck cages now in use.

Figs. 6 and 8 are the two steel frames of the district. Fig. 6 is from a zinc etching furnished by the courtesy of the Hendrie and Bolthoff Manufacturing Company, builders of the frame. Fig. 8 has been prepared from a tracing kindly furnished by the builders, The Stearns-Roger Manufacturing Company. It includes the shaft house. The property on which these structures are located is more familiarly known as the Hull City. This frame is of the high two-post type with side batter. The cost of these

four-post-side-batter type. A distinctive feature is the use of draw-bolts in all principal joints. Fig. 9, the Gold Coin, and Fig. 10, Stratton's Independence, Limited, are of the four-post-derrick type. The Gold Coin should have special mention as being high in proportion to its base. This proportion was necessary because of the proximity of the hoisting engine to the shaft. The general design of this frame has been scientifically worked out. The frame is strong and pleasing in appearance.

The other head frames of the Cripple Creek District may be reduced to the types illustrated above. There are, of course, great variations in details of bracing.

Besides the acknowledgments already given, the writer is indebted to the managements of the Portland Gold Mining Company, Stratton's Independence, Limited, and the Gold Coin for permission to make one of 45 ft. at the Rhymney Iron Company's Pengam Colliery.

MINERAL IMPORTS AND EXPORTS OF SPAIN.—Imports of fuel into Spain for the year ending December 31 were 2,136,818 tons of coal and 171,878 tons of coke. Exports of minerals for the year are reported by the *Revista Minera* as follows, in metric tons:

	1901.	1902.	Changes.
Iron ore	6,893,863	7,546,512	I. 552,649
Copper ore	1,006,669	932,775	D. 73,894
Zinc ore	75,755	95,705	I. 19,950
Lead ore	3,105	2,685	D. 420
Pyrites	404,815	473,648	I. 68,833
Salt	303,410	278,046	D. 25,364

Exports of metals included 31,525 tons of pig iron, against 43,078 tons in 1901; 21,734 tons copper, against 28,118 tons; 1,788 tons spelter, against 2,101 tons; 170,987 tons lead, against 148,492 tons in 1901.

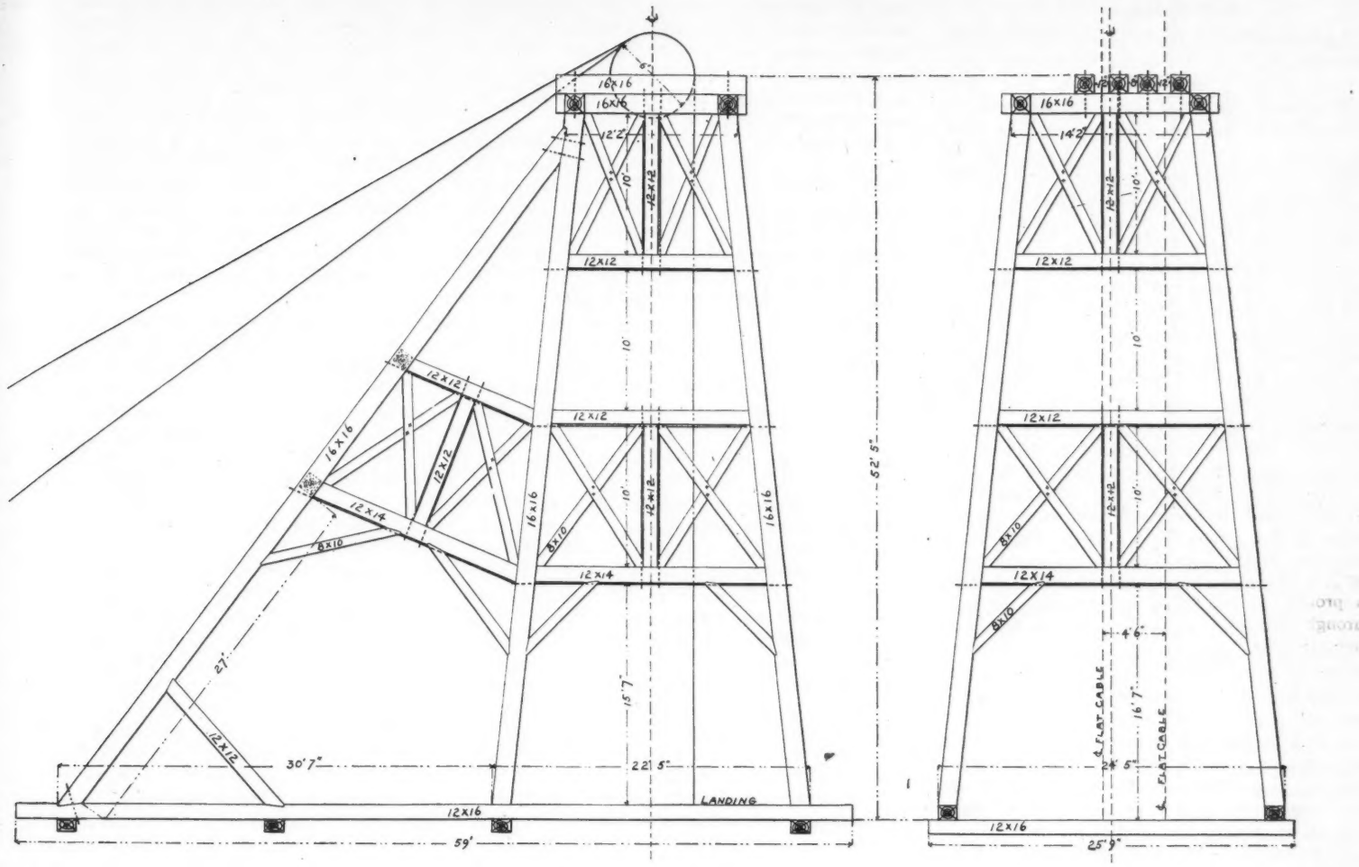


FIG. 10.—STRATTON'S INDEPENDENCE FRAME.

IE ANNUAL MEETING OF THE CANADIAN MINING INSTITUTE.

The annual meeting of the Canadian Mining Institute began in Montreal, Wednesday, March 4, and continued over Thursday and Friday. The meetings were held in the clubroom at the Windsor Hotel. The opening session on Wednesday morning, March 4, at 10.30 a. m., was held in the library of the Institute in the Windsor Hotel, when the annual reports were presented and other business transacted. The meeting was to close with the annual dinner on Friday evening. A detailed report of the proceedings will be given in our next issue.

The following officers were elected: President, Eugene Coste, Toronto; vice-presidents, John B. Hobson, Bullion, B. C.; R. E. Chambers, Bell Island, N. F.; George R. Smith, Thetford Mines, Quebec; treasurer, John Stevenson Brown, Montreal; secretary, B. T. A. Bell, Ottawa. The members of the Council chosen were as follows: British Columbia, E. B. Kirby, Rossland; J. H. Tonkin, Fernie; S. F. Parrish, Eholt. For Ontario, David H. Kerr, Cordova; Dr. N. L. Goodwin, Kingston. For Quebec, Fritz Cirkel, Montreal; Harry J. Williams, Thetford Mines. For Nova Scotia, Thomas Cantley, New Glasgow; Dr. E. Gilpin, Jr., Halifax; G. H. Duggan, Sydney.

The special topics for discussion selected by the Council at this meeting were as follows:

1. On the National Importance of Mining. Continued from last Annual General Meeting.
2. On the Value of Topographical Maps. Introduced by James White.
3. On the Collection and Publication of Mining Statistics. Introduced by Eugene Coste.
4. On the Necessity for Uniform Mining Laws and Mining Regulations throughout the Dominion. Introduced by J. M. Clark.

A large number of papers were presented at this meeting, the list being as follows:

1. President's Address, Charles Fergie, Westville, N. S.
2. On the Production and Exports of Canadian Minerals and Metals in 1902; B. T. A. Bell, Ottawa.
3. On Mining Progress in British Columbia; W. F. Robertson, Provincial Mineralogist, Victoria, B. C.
4. On Mining in the Northwest in 1902; Frank B. Smith, Inspector of Mines, Calgary.
5. On Mining in Ontario in 1902; T. W. Gibson, Director of Mines, Quebec.
6. On Mining in Quebec in 1902; J. Obalski, Inspector of Mines, Quebec.
7. On Mining in Nova Scotia in 1902; Dr. Gilpin, Inspector of Mines, Halifax.
8. On the Iron Ore Deposits of the Township of Hutton; C. K. Leith, Madison, Wis.
9. On the Sudbury Copper-Nickel Deposits (Illustrated by lantern projections); Dr. A. E. Barlow, Ottawa.
10. On Some Possibilities in Canadian Mining; Frederick Hobart, New York.
11. On Mining Possibilities of the Canadian Rockies; Bernard McDonald, Spokane, Wash.
12. On the Volcanic Origin of Natural Gas and Petroleum; Eugene Coste, Toronto.
13. On the Geology of the Alberta Coal Field; W. W. Leach, Ottawa.
14. On the Nationalization of Coal Mining; William Blakemore, Montreal.
15. On the Compressed Air Power Plant at the Belmont Gold Mine; D. G. Kerr, Cordova, Ont.
16. On the Future of Argentiferous Zinc Ores from the Slocan, B. C.; Alfred C. Garde, Sandon, B. C.
17. On the Necessity for Uniformity in Canadian Mining Laws and Mining Regulations; J. M. Clark, Toronto.
18. On the Collection and Publication of Mining Statistics; Eugene Coste, Toronto.
19. On the Sub-Division of the Carboniferous Systems in Nova Scotia and New Brunswick; Henry M. Ami, Ottawa.
20. On a New Mine Pump; L. J. Abrahams, Bruce Mines, Ont.
21. On the Occurrence, Mining, Milling and Uses of Canadian Asbestos; F. Cirkel, Montreal, Ont.
22. On the Stewart River Gold Dredge; A. W. Robinson, Montreal.
23. Notes on the History of the Mineral Industry in the Ninteenth Century; Willet G. Miller, Provincial Mineralogist, Toronto.
24. On Economic Geography; James White, Dominion Geographer, Ottawa.
25. On the Construction and Operation of McDougall Calcining Furnaces; S. Severin Sorensen, Murray, Utah.
26. On the Principles Underlying the Determination of the Location and Extent of Magnetic Ore Bodies by Magnetic Surveys; Eugene Haanel, Dominion Superintendent of Mines, Ottawa.
27. On the Nickel Mines of New Caledonia; R. G. Leckie, Sudbury, Ont.
28. On the Modern Blast Furnace Laboratory and Its Work; W. Dixon Craig, Midland, Ont.
29. On the Use of the Magnetic Needle in Locating Deposits of Pyrrhotite; A. B. Willmott, Sault Ste. Marie, Ont.
30. Notes on Prospecting; B. J. Forrest, Broad Cove, C. B.
31. On the Gold Deposits of Western Ontario; Charles Brent, Rat Portage.
32. On the Occurrence, Concentration and Uses of Molybdenite; J. Walter Welles, Kingston, Ont.
33. On Some Primitive Methods of Mining and Smelting in India (illustrated by lantern projections); T. L. Walker, Toronto University.
34. On the Davis Calyx Drill; Mr. Davis, New Glasgow, N. S.

CYANIDATION AT THE HOMESTAKE MINE.*

By C. W. Merrill.

Nature of the Ore.—At the present time the bulk of the output of the Homestake Mine comes from the lower levels. It may be described as a hornblendic garnetiferous schist, which has been crushed and cemented by free silica and pyrites, the latter being present to the extent of 7 to 8 per cent. In addition to the iron pyrite the ore contains pyrrhotite, arsenopyrite, and traces of chalcopyrite.

Milling.—The ore is first crushed in rotary breakers at the shaft, the product varying in size from that of sea sand up to pieces four inches in diameter. From bins at the mine, the broken ore is trammed to the three mills, that is, the Homestake and Golden Star, containing 200 stamps each, and the Amicus, in which there are 140, making a total of 540 stamps. From the bins at the mill the ore is fed automatically into the batteries, which are provided with the narrow mortar, well known to millmen as the Homestake type. The average weight of a stamp is 900 lbs. Each stamp drops 10½ ins. 88 times per minute. The screens in use are the steel needle-slot type No. 8, and the bottom of the screen-opening averages 10 ins. above the top of the dies. As a consequence of the long drop, high discharge and small area of screen opening, an extremely fine pulp is produced, so that about 80 per cent will pass through a 100-mesh. In spite of the fine degree of pulverization, the duty of the stamp is fully four tons per 24 hours. This high stamp duty is rendered possible by the character of the ore, for the schist and pyrites crush readily, and the quartz serves as a medium of attrition. Furthermore, a large proportion of water is used (8 to 10 times the weight of ore crushed), and finally, the narrowness of the mortar, which is only 12 ins. in width at the lip, accelerates the expulsion of the pulp. Amalgamation takes place both inside and outside of the battery. The outside plates are four in number, each is 54 by 144 ins. and ⅛ in. thick, they succeed each other in a series below each mortar. The first is a copper plate, and the other three are silver-plated, the weight of the plating being 2 oz. per square foot. The addition of three silver plates to each battery has proved a great advantage and yielded an additional profit of about $250,000 during the year 1902, as compared with the yield heretofore obtained from the single outside plate. At the present time the yield by amalgamation is from 70 to 75 per cent. The maximum yield on the plates is obtained when the temperature is below 50° F. The total cost of milling in the 200-stamp mills is approximately 40 cents per ton.

Classification.—The pulp, after amalgamation, contains 8 to 10 parts of water to 1 of ore, much of the latter being infinitesimally fine. The sizing test of the tailings as they leave the mill is about as follows: Coarse, or that portion remaining on 100-mesh screen, 22 per cent; middles or that portion between 100 and 200-mesh, 18 per cent; fine or that portion passing a 200-mesh screen, 60 per cent; that is, the cross-section of 60 per cent of the particles issuing from the mortar is less than 1-100,000 of a square inch in area. In order to facilitate both the transportation and the classification of the tailings, so as to permit the pumping plant to return its former percentage of water to the mill, an upper cone house has been installed, wherein there are 12 gravity setting cones 7 ft. in diameter and with 50° sides, which throw off one-half of the water and about one-fifth of solid matter, the latter being very fine slime, which in sizing during 1902 showed: no coarse, 1.76 per cent middles and 98.24 per cent fines. The slimes are subsequently settled out, and part of the water is returned to the mills. The thickened pulp from the bottom of the cones contains all of the leachable material, and some of the slime. This portion is passed through a 12-in. cast iron flanged pipe on a minimum grade of 2½ per cent, with as few turns as possible, to the cyanide plant.

The second step in classification now takes place by means of six more gravity settling cones, the overflow from which, similar in composition to that of the first 12 cones, is conducted to a collecting tank, whence it is drawn for the purpose of sluicing out the leachable material. After this treatment, the average sizing of this cone overflow for 1902 was: No coarse; 1.38 per cent middles; 98.62 per cent fines.

The underflow which is now quite thick, passes from the second set of cones to 24 conical hydraulic classifiers, which carry a device patented by the writer, for discharging the sand, and introducing water. By this means the admission of water does not result in currents of varying velocity, such as interfere with the uniform separation of slimes from granular material.

These sizing cones complete the classification, itself a difficult problem because, first, of the extreme fineness of the pulp, and, secondly, because the writer was determined to avoid double treatment. The latter entails a largely increased installation and operating cost, but is rendered necessary unless a product practically freed from slime can be obtained.

The slime overflow from the hydraulic classifiers had during 1902 the following average sizing: Coarse, 0; middles, 1.46 per cent; fines, 98.45 per cent. As regards the slimes referred to, they will practically all pass the 200-mesh screen, the middles being largely wood pulp from mine timbers.

The writer does not doubt that the importance of the most perfect classification possible will be recognized shortly as a vital feature in the cyanidation of wet-crushed ore, and that there will be less tendency to follow the old German practice of spitzkasten and spitzlutten, which are very imperfect machines as compared with the cone-sizer. The writer's judgment is that a scientific system of classification, by which all the granular or angular material may go to the leaching tank and all the amorphous to the slime plant, will, in the future, characterize the best designed mills.

Experience indicates that as the proportion of ore from the lower levels increases, we can treat an even finer product, a recent charge containing as high as 40 per cent fines, while maintaining the normal leaching rate of 3 to 4 ins. per hour throughout the treatment. This is undoubtedly due to the fact that the fines from the deeper workings contain a greater proportion of granular material, and a less proportion of amorphous hydrated ore.

By these three steps in the classification the pulp is separated into non-leachable slimes, all of which will pass a 200-mesh screen, and a direct leachable product which, although very clean and free from mud, is still of a very fine average, as the following sizing test, the average for 1902, will show: Coarse, remaining on the 100-mesh, 40.5 per cent; middles, 100 to 200-mesh, 30.8 per cent; fines, passing 200-mesh, 28.7 per cent.

Treatment.—The leachable pulp, which contains 10 to 12 per cent of pyrites, is now ready to go to the vats, and on the way lime is added in quantities varying from 3 to 5 lbs. per ton. At first we tried adding this lime in the mills, as is done in Africa, but found that the amalgamation was most seriously affected thereby; not only was the plate completely coated, weeks being required to get it back into good condition, but the tailings assayed higher. This result emphasizes the fact that the process must fit the ore, and that attempts to make an ore fit a process are unavailing. The practice of feeding lime into the battery is unanimously pronounced to give the best results in Africa, and to reduce the loss in the slimes to one-half. In our case, however, we have demonstrated that the best results follow from crushing the lime wet into a running pulp, which joins that from the cones, whereby there is less slacking and less loss of flocculent lime in the vat overflow, that is, in the water which overflows the vat, the sand having settled out. Not only is it a distinct advantage to have our lime go into the tank in unslacked granules, but recent investigations are proving that the average size of these granules has an important bearing on the subsequent cyanide decomposition. We are not prepared as yet to say what is the best mesh of screen to use on our lime stamp battery, but at present we are using a wire screen, the opening of which is 11-64 of an inch square. In this connection it should be said that only the purest lime should be used, the magnesia in the ordinary dolomitic limestone being objectionable for several reasons.

The classified pulp and the lime pulp having comingled, the mixture passes to the distributor, which is of the garden sprinkler, or Butters & Mein type.

Of these distributors there are two, one for each row of vats, hung from a carriage which travels on a track and the step of which rests on the top of the center bottom discharge gate of each vat when the distributor is in operation. There are 14 sand vats, each 44 ft. in diameter, 9 ft. deep inside, and holding 610 tons of sand. To fill one of these requires from 11 to 11½ hours, which, with our equipment, permits of about five days' contact with solution before it is necessary to discharge the vat. After filling, the drain valve is opened, the top leveled and the stronger of the two stock solutions, of a strength of 0.14 of 1 per cent KCN, is run on. The contact with this solution, including frequent drainages for the purpose of drawing in air, is maintained for about three days. The air contact is very important in Homestake ores, owing to the presence of pyrrhotite or sub-sulphide of iron, which absorbs oxygen with great avidity and which would greatly retard the dissolving action of the cyanide solution, were not quantities of this essential oxygen introduced. The effluent solution, during this period, having normally a strength of 0.14 per cent of cyanide, is run to the weak precipitation tanks, of which there are two, each 26 ft. in diameter by 19 ft. deep, and holding 300 tons of solution.

After the strong solution has been in contact for three days the weak solution, normally of a strength of 0.10 per cent KCN, is brought into the charge and this contact is maintained for two days. The effluent solution during this period is run to the strong precipitation, or rather, collecting tanks, which are of the same size and number as the weak precipitation tanks.

After contact with the weak solution is complete, wash water is brought into the charge, and the washing continued until the effluent solution is down to 0.03 or 0.02 per cent in KCN, and assays from 5 to 7c. per ton. The charge is now ready for sluicing, which operation is accomplished by two men with a 3-in. hose, in about four hours, using the slime water from the overflow of the second settling cone. The four side gates and one center gate afford ample facilities for discharge. The last inch or so of the sand is sluiced with clear water, under 75 lbs. pressure, through 1½-in. hose and the ⅛-oz. duck filter, under which is another of cocoa matting, is washed clean. The vat is filled with water and is then ready for the next charge.

Precipitation.—As stated above, the effluent solution resulting from the leaching with strong solution is run to the weak precipitation tanks, and has a value approximately of $2 per ton and a strength of 0.10 per cent KCN. When one of these weak precipitation tanks is full, the stream is turned to the other, and the former is then ready for precipitation. It contains 300 tons of solution, which is brought into agitation by means of compressed air; and about 60 lbs. of zinc powder in the form of an emulsion is sprayed in during the agitation. The pump, which is of the compound, duplex, outside packed plunger type, is then started, and the mixture is passed through two large filter-presses, 36 ins. square, of the flush plate and distance frame pattern, containing 24 frames each 4 ins. in depth. The gold, silver and excess of zinc remains in the frame

* Abstract from a paper read before the Black Hills Mining Men's Association. In this paper percentages are by weight and not by volume. The sizings are based on the following: "coarse" is that portion of the sample which will remain on a 100-mesh screen, diameter of wire 0.00433 in., size of opening 0.00575 in. square; "middles" is the material finer than the opening of the above 100-mesh screen and coarser than the opening of the commercial 200-mesh screen as given below; "fines" being the material which will pass such a 200-mesh screen, diameter of wire 0.00216 in., size of opening 0.00312 in. square. A further sub-division of fines is also mentioned, which is based upon a distinction between the granular and the amorphous condition respectively of this product.

and on the cloth, the barren solution passing through the cloth and on to the weak solution storage tank below, which is the same size as the sand vats, whence it passes again to the sand as weak solution. Its value has been reduced by this operation from $2 to 5 or 10c. per ton, being a precipitation of 95 to 97½ per cent. The efficiency of this method of precipitation lies largely in the fact that the cloths of the presses are coated with about ¼ in. of powdered zinc and precipitate, so that every particle of solution, having to pass through the cloths, gets a molecular contact with the fine zinc, which is true of no other precipitation process. The presses are run without opening for a month, at the end of which period the press gauges show only about 10 lbs. pressure, notwithstanding the fact that they then contain about a ton of precipitate, worth about $50,000. They are cleaned up by two men in about six hours, including the putting together with new cloths.

It is worth while in passing to suggest that figures covering the labor of cleaning up $50,000 from zinc-boxes or electrolytic precipitation would form an interesting comparison.

We must now return to the effluent solutions resulting from the contact of the tailings with weak solution during the latter part of the leaching; these solutions are run to the strong solution collecting vats, which when filled are strengthened to 0.14 KCN and pumped directly without precipitation, to the strong solution storage tank, of the same capacity as the weak storage, whence it goes on to the early treatment of the charge as before mentioned. Its value is from 30 to 50c. per ton. It will thus be seen that the strong solution of one day becomes the weak solution of the next day, and that values are all accumulated in the weak precipitation tanks. The strong solution thus has an approximately constant value; that is to say, only one-half of the total effluent solution is precipitated, the other half being kept at a constant low value.

Refining Precipitate.—The refining of cyanide precipitates is of importance, owing to the losses which are known to occur by the ordinary methods; these losses are from 2 to 6 per cent, therefore a description of the process we use at the Homestake, in which the loss is less than 0.1 per cent, will be of interest. The precipitate, after removal from the presses, is treated first with dilute hydrochloric acid in a lead-lined mixing tank, equipped with a mechanical agitator, a hood and a powerful exhaust fan. After agitation and settling, the supernatant liquid is forced through a filter-press by air pressure. Sulphuric acid is then added, agitation begun and the mixture heated. It is then settled and the supernatant solution put through the press, as in the case of the hydrochloric acid. Wash water is then added to the mixing tank and the whole mixture put into the press, where it is further washed. The resultant acid treated precipitate is then removed to a large steam dryer, where a part of the moisture is expelled, but never all, and the precipitate is mixed with litharge, borax, silica and powdered coke. When thoroughly mixed, it is sprinkled with a solution of lead acetate and the whole mass briquetted under a pressure of 4,000 to 6,000 lbs. per square inch. The zinc having been removed and the briquettes having been dried, they are charged into the cupel; a borax slag develops upon their outer surface, and they fuse quietly, quickly and at a low heat, without dust or volatilization losses. The lead absorbs the values, sinking to the bottom, and the slag is tapped off. All of the slag having been removed, the lead is cupelled off as litharge and the resultant metal, .975 to .985 fine, is ready to run into bars. The cupel slag and the cupel bottom are then put through the blast furnace, the lead content of the slag is reduced to metal, which absorbs the values and is drawn from the lead well in the usual manner. This lead is returned to the cupel at the next clean-up, the litharge from the cupellation goes to the next precipitate, and the blast furnace slag is worth less than $5 per ton. The total cost of this refining amounts to less than 0.75 per cent, so the Homestake Company realizes $20.52 per oz. for its cyanide gold, less the usual United States Assay Office charges on ore bullion and the expressage to New York. These charges total between 10 and 11c., so that the next realization per ounce of fine gold precipitated is $20.42 in New York exchange. A parting plant is now contemplated, which will make a further saving in this connection and enable the company to turn out fine gold and fine silver.

Having now described the process in detail, let us turn to the question of tonnage, percentage and costs. The maximum monthly tonnage of this plant was attained in October, 1902, when 40,236 tons, or 1,298 tons per day, were treated. This gives to the Homestake Company the largest sand treatment cyanide plant in the world, the next largest being, it is believed, that of the Simmer & Jack, at Johannesburg.

As a comparison of the various assay determinations and valuations which the bullion produces is always of interest, the following figures for the last half of the year 1902 are given:

Extraction—that is, difference between charge and residue assay multiplied by the tonnage—equals, $229,579.

Precipitation—that is, difference between assays of unprecipitated and precipitated solutions multiplied by the solution tonnage—equals $301,233.

Gold in precipitate—that is, the assay value of the precipitate sampled upon removal from the presses—$302,895.

Gold value of bullion shipped, $307,635.

Silver value of bullion shipped, $2,874.

The average proportion recovered in bullion by the treatment for the past six months is 74.7 per cent.

This is not as high a percentage by bullion as should be recovered from a porous or oxidized ore, or one in which the values are along cleavage planes. But, in view of the fact that such a high percentage is recovered by amalgamation, that the values are very finely dessiminated in the Homestake ore, that the tailings are very low grade, we feel, and all our tests so far have verified our conclusions, that it is the economic percentage, that is, the percentage which yields the maximum profit.

As to operating costs at the cyanide plant, the following are averages per ton for the year 1902:

Classification		$0.017
Treatment—Cyanide	$0.152	
Labor	0.030	
Lime	0.022	
Supplies	0.005	
		0.209
Precipitation		0.026
Power		0.051
Water		0.026
Assaying		0.013
Refining		0.006
Miscellaneous		0.005
Total		$0.353

The average value of the sand treated during the year was $1.65 per ton.

PRICES OF LAKE IRON ORES.

At the recent meeting of the Iron Ore Association in Cleveland, O., the following estimates for the season were presented:

	Estimated production 1903.	Sales to date.	Postponed ore.	Unsold ore on dock Jan. 1, 1903.	Balance available for sale.
Old Range Bessemer	7,350,000	5,969,250	30,935	56,512	1,406,327
Old Range Non-Bessemer	5,839,860	2,988,880	238,997	84,766	2,696,769
Old Range Sil., Mang. and Lg.	3,721,056	1,418,500	20,197	93,622	2,375,987
Totals Old Range	16,910,916	10,376,610	290,129	234,900	6,479,873
Mesabi Range Bessemer	12,547,500	9,627,868	168,306	55,560	2,811,880
Mesabi Range Non-Bess.	4,835,500	3,427,956	8,344	4,925	1,404,125
Totals Mesabi	17,383,000	13,055,824	171,650	60,485	4,216,011
Grand t'ls	34,193,918	23,432,934	481,779	295,385	10,695,088

The base prices for Lake ores, for the season of 1903, have been fixed as follows:

Mesabi Bessemer.—Basis, $4 per ton, f. o. b. lower lake ports; guarantee, 63 per cent iron, 0.045 per cent phosphorus, 10 per cent moisture.

Mesabi Non-Bessemer.—Basis, $3.20 per ton, f. o. b. lower lake ports; guarantee 60 per cent iron, 12 per cent moisture.

Divided into three classes, according to structure, as follows: Difference between first and second class, 15c. per ton, and differential between second and third class 10c. per ton, or a total of 25c. per ton between first and third class. Guaranteed upon Longyear 58 per cent iron and 10 per cent moisture, making the latter ore $3.16 per ton, f. o. b. lower lake ports. The classes are arranged as follows:

First Class.—Stevenson, Wallace, Admiral, Pearce, Cass, La Belle, Elba, Fray, Biwabik, Butler, Steese, Hale, Kanawha, Longyear, Morrow, Croxton, Leetonia, La Rue, Kinney, Top Brown, Atlas, Cypress, Grant, Laura, Winifred, Victoria, Shilling Columbia, Columbia, Franklin, Leonard.

Second Class.—Commodore, Union, Petit, Malta, Sparta, Corsica, Minorca, Lincoln, Jordan, Beaver, Albany.

Third Class.—Mahoning and Vulcan.

Old Range Bessemer.—Basis, $4.50 per ton, f. o. b. lower lake ports; guarantee, 63 per cent iron, 0.045 per cent phosphorus, 10 per cent moisture.

Old Range Non-Bessemer.—Basis, $3.60 per ton, f. o. b. lower lake ports; guarantee, 60 per cent iron, 12 per cent moisture.

BRITISH IRON AND STEEL EXPORTS.—The exports of iron and steel from Great Britain in January are valued by the Board of Trade returns as below:

	1901.	1902.		Changes.
Iron and steel	£2,079,621	£2,402,237	I.	£322,616
Machinery	1,419,341	1,520,908	I.	101,567
New skips	584,240	347,369	D.	236,871
Totals	£4,083,202	£4,260,514	I.	£177,312

The falling off in new ships reduced the total this year; otherwise there was a large increase.

BRITISH EXPORTS OF MINING MACHINERY.—The exports of mining machinery from Great Britain in January are valued as follows:

	1901.	1902.		Changes.
European countries	£4,538	£2,759	D.	£1,779
South America	3,211	1,140	D.	2,071
East Indies	3,956	10,499	I.	6,543
Australia	11,611	6,202	D.	5,409
South Africa	13,392	19,296	I.	5,904
Other countries	4,356	13,125	I.	8,769
Totals	£41,064	£53,021	I.	£11,957

There was a notable decrease in the exports to Australia. Those to South Africa show a gain, but hardly so large as had been expected.

ABANDONING AN OLD IRON PLANT.—The *Bulletin* of the American Iron and Steel Association reports that Mount Alto Furnace and the attached forge have been dismantled. The works were at Mount Alto in the Cumberland Valley. The old charcoal furnace was built in 1807, and the forge was added in 1866.

A RUSSIAN SALT MINE.—The Iletzk salt mines are on the Kirghiz Steppe, about 40 miles from Orenburg. In the beginning of the sixteenth century, Bashkirs worked this layer in a primitive way. The Russian Government took possession of it in 1753. In 1810 the Government built the Orenburg-Samara salt track, and from 1817 a regular exploitation of the mine has been carried on, first by convicts and since 1849 by free workmen. At present a company of Orenburg merchants hold these mines on lease from the Government, but the work is not extensive. The yearly production does not exceed 1,500,000 poods (24,389 tons), because of the lack of good roads—the place having been inaccessible—but now that a branch of the Orenburg-Tashkent Railroad leads to the mine, it is expected that the production will be largely increased.

A RIEDLER PUMPING PLANT FOR HYDRAULIC MINING IN ALASKA.

Few people are aware of what has been done to develop our great Northwestern territory, and of the many obstacles met with in the installing of machinery where transportation facilities, with the exception of a few carrying vessels are very meager.

In the fall of 1899 Mr. C. D. Lane placed an order with the Allis-Chalmers Company for a pumping plant, to be used for hydraulic mining, as follows: A duplex double-acting Riedler pump, plungers 9 in. diameter and 42 in. stroke, driven by a four-cylinder triple-expansion condensing Corliss engine, steam cylinders 18 ins., 30½ ins. and two 32 ins. diameters, all having 42-in. stroke; pump capacity, 3,000 U. S. gals. per minute, to a total head equivalent to 790 ft., when running 72 revolutions per minute, with a steam pressure at engine throttle of 175 lbs. per sq. in. The steam to supply this engine is furnished by three 160 horse-power Sederholm safety steam generators, built for a working pressure of 180 lbs. The plant is completely equipped with auxiliary machinery, consisting of special suction surface condenser independent vertical flywheel air-pump, oil separator, oil filtering hot-well, steam separating receiver, primary and secondary Berryman feed-water heaters, etc. Non-conducting material on an average of 3 ins. thick is provided to cover all live steam surfaces, piping and the main shell of boilers.

To give a fair idea of the energy required to undertake such an installation in a rugged country, the following account of this hydraulic pumping plant of the Wild Goose Mining and Trading Company, at Nome, Alaska, is taken from a letter of the erecting engineer sent out by the Allis-Chalmers Company to take charge of the installation.

"I am very glad to know that my work is satisfactory to the people at home. It is not altogether an easy proposition to be so far away from supplies and other things which you are aware of. However, everything has turned out all right, and I have no complaint to make of any kind.

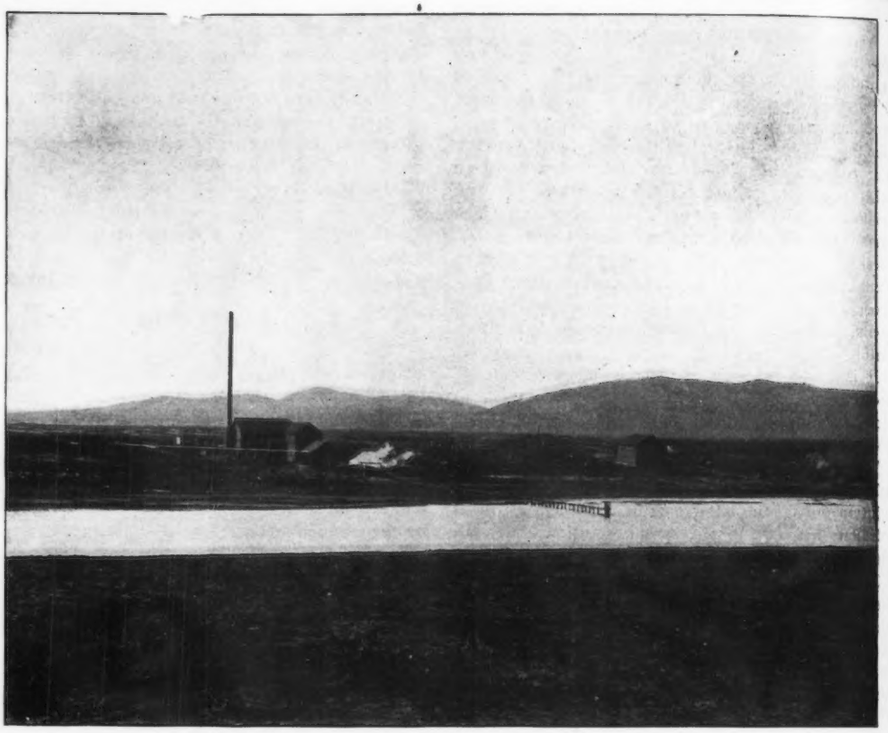
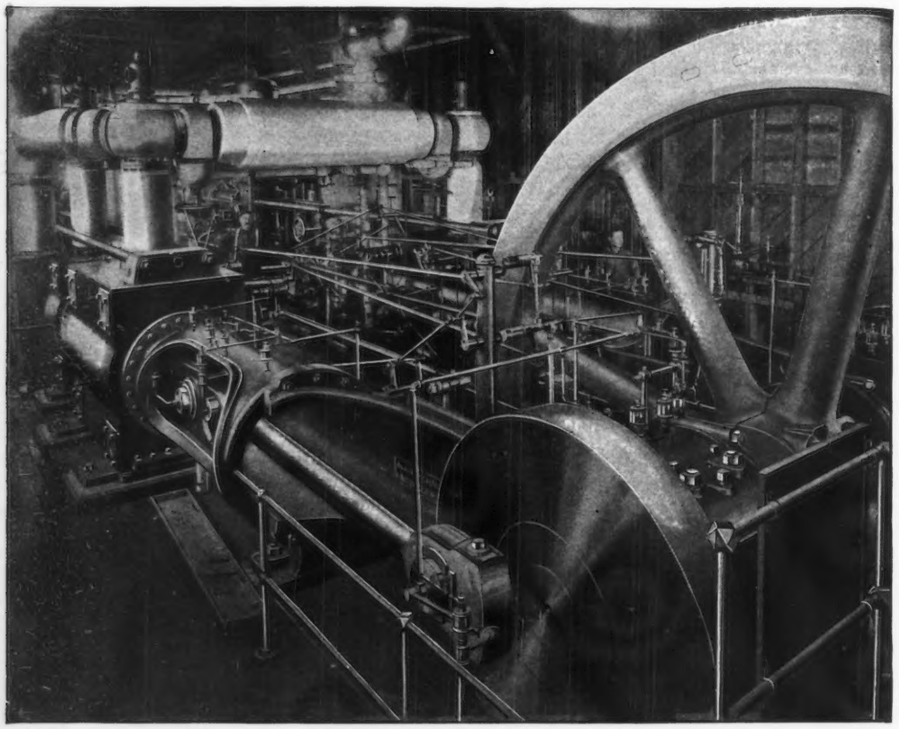


FIG. 1.—WILD GOOSE PUMPING PLANT, NOME, ALASKA.



INTERIOR OF PUMP ROOM, WILD GOOSE PLANT.

"To give a little history of the Wild Goose Mining and Trading Company's pumping plant at Nome: On August 14, 1900, the steamship *C. D. Lane* let go her moorings from the White Star dock at Seattle and began her journey to Nome with the owner of the ship and cargo. Mr. Lane asked me what I thought of landing all the heavy machinery at Nome. I answered that unless something had already been provided for lifting the machinery off the lightering barges, that we certainly would have a big job on hand. He replied that he had provided everything that was necessary for lifting the heaviest pieces we had aboard. After 17 days' journey, anchor was dropped just outside of Nome. Even with the big derrick it did not look like very easy work. The breakers rolled high for more than a month. The ship at times was obliged to go behind Sledge Island, in fact, three or four times, to obtain proper shelter. At the same time all the barges were thrown ashore like cigar boxes. Mr. Lane had five barges of his own besides those he was obliged to rent at great cost. When the sea would calm down and the ship get back from Sledge Island, then all the barges would be on shore badly in need of repairs, and as soon as they would get them in the water again and commence to unload, up would come a storm and the same story over again. This happened four times in all, but luckily not one piece was lost. At times we had many narrow escapes. The lives of several of the men were nearly lost by being crushed between the barges as they came together. At last all was gotten off and landed on the beach with no one seriously hurt. The machinery was not left for long on the beach, but was taken across Snake River as fast as loaded in railroad cars built for five tons capacity, but which by bracing and propping were made to carry the heaviest pieces, which were all safely landed at destination, after a journey of several thousand miles.

"The foundation of this plant is probably alone of its kind; first, it is the only one of any dimensions so far north; second, it is built of thousands of tons of gold-bearing sands taken at the old mouth of Snake River, where it formerly emptied into the sea; third, it is resting on partly frozen ground and ice which has been there for an unknown length of time. The foundations are located about west longitude 165°, and north latitude 62° 30'.

"This pump is used for hydraulic mining on Copper Gulch and Anvil Creek. It will in time be used on all the claims on Copper and east and south of Anvil Mountain. Last season it was used to deliver water on Copper Gulch, Mattie Claim Nos. 4, 8 and 10, Anvil Creek. The distance that the water is pumped is more than seven miles, through delivery pipe laid on and covered with tundra. The main pipe line is 18 ins. diameter, with distributing pipe lines 8 ins. diameter. The main pipe line runs up the top of Anvil Mountain a distance of 4½ miles, the balance being 8-in. pipe, which will next summer be replaced by pipe of larger size. The plant is situated about a mile from the present mouth of Snake River."

The following letter, dated October 28, 1902, received from the Wild Goose Mining and Trading

Company, shows with what success water can be pumped to a high level for hydraulic mining, and also what success the builders have attained in building machinery for such conditions:

"We started the pump you built for us on August 1 last for regular work, and ran continuously until October 21, with the exception of about 36 hours, caused by some slight delays, mostly due to the pipe line. The pump has performed all the duties contracted for right up to the mark, to deliver 200 miners' inches of water under a 6-in. mine pressure 700 ft. high through four miles of 18-in. diameter pipe, or 2,600 gals. per minute.

"I think that our Sederholm boiler plant is the most economical and best boiler plant I ever saw.

"It may be of interest to you to know that we have demonstrated the fact that water can be pumped to a high elevation to a profit for washing gold-bearing ground, as you will see when I tell you that in 80 days' use of the pump water we took out of the ground $250,000 more money than we possibly could have done without it. I hope and believe the success of this pumping plant will be the means of other similar plants being erected."

Placer beds are generally situated in localities where fuel is very expensive, so that, should ordinary pumping engines be used, all or nearly all, of the return will be eaten up in operating expenses, thus rendering the working of such beds unprofitable. The failure of many mining claims where it is necessary to use pumping engines to obtain the requisite hydraulic pressure, is due to the fact that to save the first cost in machinery, the cheapest grades of pumping engines are installed, little or no attention, being given to the cost of the operation and maintenance of the plant.

The cost of the plant above described is many times more than plants for this purpose that have heretofore been installed by the Allis-Chalmers Company. This installation, however, has resulted in financial success where others have been failures.

In the illustrations Fig. 1 is a general view of the "tundra," with the pumping plant in the foreground. Fig. 2 is a view taken from the front end of the pumping engine. Owing to the difficulty of making the foundation the receivers and receiver piping of this engine are placed above, provision being made for running either side of the pumping engine alone if required.

PIG IRON PRODUCTION IN CANADA.

The American Iron and Steel Association has received direct from the manufacturers the statistics of the production of pig iron in Canada in 1902. They show an increase of 74,581 gross tons, or over 30 per cent, as compared with 1901.

The total production in 1902 amounted to 319,557 gross tons, against 244,976 tons in 1901 and 86,090 tons in 1900. In the first half of 1902 the production was 157,804 tons and in the second half it was 161,753 tons, a gain of only 3,949 tons. Of the total production last year, 302,712 tons were made with coke and 16,845 tons with charcoal. A little over one-third of the total production was basic pig iron, namely, 107,315 tons. The bessemer iron made amounted to about 9,000 tons. Spiegeleisen and ferromanganese have not been made since 1899.

The following table gives the total production of all kinds of pig iron (including spiegeleisen and ferromanganese) in Canada from 1894 to 1902. Prior to 1894 the statistics of pig iron production in Canada were not collected by the Association. The figures are in long tons:

1894	44,791	1899	94,077
1895	37,829	1900	86,090
1896	60,030	1901	244,976
1897	53,796	1902	319,957
1898	68,755		

On December 31, 1902, the unsold stocks of pig iron in Canada amounted to about 20,000 gross tons, as compared with 59,472 tons at the close of 1901 and 12,465 tons at the close of 1900. Of the unsold pig iron on hand on December 31 over 19,000 tons were coke pig iron.

On December 31, 1902, Canada had 14 completed blast furnaces, of which 7 were in blast and 7 were idle. Of this total 9 were equipped to use coke for fuel, 4 to use charcoal, and 1 to use mixed charcoal and coke. In addition, 4 coke and 2 charcoal furnaces were being built or were partly erected on December 31, but work on several of the furnaces was temporarily suspended.

The *Bulletin* of the Association gives the following notes on Canadian blast furnaces at the opening of the present year:

The Cramp Steel Company, Limited, has put in the foundations for a blast furnace at Collingwood, Simcoe County, Ontario. Work upon the furnace was temporarily suspended a short time ago, but it is to be resumed early in the spring. The company expects to have the furnace ready for operation next fall. Coke will be used. Its daily capacity will be about 250 gross tons. The company is now erecting a rolling mill at Collingwood, to be equipped with one 10 and one 18-in. train of rolls, which it expects to have completed early in March. Two 18-ton open-hearth steel furnaces will be connected with the mill.

The Nova Scotia Steel and Coal Company, Limited, of New Glasgow, Nova Scotia, broke ground in June, 1902, for a new furnace at Sydney Mines, Cape Breton, Nova Scotia. The furnace will be 85 by 17 ft., and will have a daily capacity of about 200 tons of basic and foundry pig iron. Coke will be used and red and brown hematite ore will be obtained from Nova Scotia and Newfoundland. The furnace will be equipped with four Robert hot-blast stoves. It will probably be completed in September. The company now has a furnace at Ferrona, Nova Scotia, with an annual capacity of 33,000 gross tons. It ran for 44 weeks in 1902, and was active on December 31.

The Londonderry Iron and Mining Company, Limited, of Londonderry, Nova Scotia, is rebuilding Furnace A, at Acadia Iron Mines, and will blow it in in May. The stack will be 75 by 17 ft., and will have an annual capacity of 48,000 tons of foundry iron. The company does not contemplate blowing in Furnace B in the near future, but may build it later on.

Bridgeville Furnace, at Bridgeville, Pictou County, Nova Scotia, was idle during the whole of 1902. The furnace was last active in 1899, when mixed coke and charcoal were used for fuel and pig iron, spiegeleisen, and ferromanganese were made. It is not likely to resume work in the near future.

The Algoma Steel Company, Limited, of Sault Ste. Marie, Ontario, had not completed on December 31, 1902, the erection of the two furnaces which it began building over a year ago. They will have a total annual capacity of about 100,000 tons. One will use coke and the other charcoal.

The Dominion Iron and Steel Company, Limited, of Sydney, Nova Scotia, had two of its four furnaces in blast on December 31. The two idle furnaces will not resume until a sufficient supply of coke can be assured. In 1902 the company made basic and foundry pig iron.

The Canada Iron Furnace Company, Limited, had its charcoal furnace at Radnor Forges, Quebec, out of blast for relining on December 31. It resumed work on January 20. The furnace ran for 38 weeks in 1902.

RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

SPECIALLY REPORTED.

WHAT CONSTITUTES A DEDICATION OF STREETS ON MINING PROPERTY.—Where a mining company, owning certain property, leases portions of same for building purposes, leaving open spaces for passageways in the nature of streets and alleys, this makes a dedication of such streets to public use during the time the lots are so rented and occupied, and it cannot prevent merchants, peddlers, etc., from making use of such streets to visit the occupiers of such houses and selling goods and merchandise, though the same may be in competition with a truck store maintained by such company, on the ground that such use of the streets is a trespass on the property of the mining company and should be enjoined.—Alden Coal Company v. Challis (103 *Appellate Court Reports*, 52); Appellate Court of Illinois.

WHEN PARTIES WILL NOT BE REQUIRED TO MARKET PRODUCT OF GAS-WELL.—Where landowners contracted in writing to permit a party to enter on their land and construct gas or oil wells in consideration of $100 rent for the product of each well, "if such product was being used off the premises, and the free use of gas needed by the owners for domestic purposes," such contract did not contain an implied covenant by such party to operate the wells so as to entitle the owners to compel a cancellation of the contract because of his failure to transport and market gas produced by a well constructed, and his failure to pay the rent for the gas from such well.—Gadbury v. Ohio & Indiana Consolidated Gas Company (65 *Northwestern Reporter*, 289); Appellate Court of Indiana.

WHO HAS RIGHT TO SUE ON MINER'S DEATH IN ILLINOIS MINE ACCIDENT.—Under the laws of Illinois (Hurd's Revised Statutes, 1889, page 1175), providing that in case of the death of a miner by willful violation of the act a right of action shall accrue to the widow of the deceased, his lineal heirs or adopted children, or any other person who was dependent upon him for support, the right of action is in the widow, if there is one; if not, then in the lineal heirs, which includes parents or adopted children; or if none, then in persons dependent upon him for support; but brothers or sisters have no cause of action, unless they were dependent upon him for support.—Willis Coal & Mining Company v. Grizzell (65 *Southeastern Reporter*, 74); Supreme Court of Illinois.

ABSTRACTS OF OFFICIAL REPORTS.

Quincy Mining Company, Michigan.

This company's report covers the year ending December 31, 1902. The financial statement shows assets as follows: Cash and copper, $563,168; accounts receivable, $285,911; supplies, etc., at mine, $255,027; total, $1,104,106. Accounts payable were $223,746, leaving a balance of assets amounting to $880,360.

The net earnings for the year, as shown below, amounted to $498,000, and the balance from previous year was $1,082,360, making a total of $1,580,360. From this two dividends—one of $4 and one of $3 per share—were paid, the total amount being $700,000, leaving a surplus of $880,360. A dividend of $2.50 per share—$250,000 in all—has been declared since the close of the year, and was paid February 15, 1903.

The receipts and payments for the year were as follows:

	Amount.	Per lb. Copper.
Sales of copper	$2,275,819	11.99
Interest, etc.	31,097	0.16
Total receipts	$2,306,916	12.15
Mine expenses	$1,477,813	7.78
Taxes in Michigan	49,092	0.26
Smelting and other expenses	185,887	0.98
Construction	96,124	0.51
Total expenses	$1,808,916	9.53
Net Balance	$498,000	2.62

The mine statement shows that the total rock mined was 983,730 tons; rock hoisted, 984,594 tons; stamp rock treated, 953,019 tons. The mineral obtained was 26,425,670 lbs., of which 4,920,810 lbs. came from the rock-houses and 21,504,860 lbs. from the stamp-mill. This mineral yielded 72.9 per cent, or 18,988,491 lbs. refined copper. The yield per fathom of ground broken was 483 lbs. mineral, or 347 lbs. copper. The yield of copper per ton stamped was 19.92 lbs., or 0.996 per cent; per ton hoisted, 19.28

lbs., or 0.964 per cent. The average force of men employed was 1,636, of whom 562 were miners. The average wages of miners on contract were $62 per month.

The report of Superintendent John L. Harris shows the usual amount of development work, with fair results. A greater proportion of low-grade rock is treated now than formerly, reducing the average yield. The underground electric haulage has given excellent results, reducing costs considerably. The report says:

"About 50 per cent of the stamp rock mined, tributary to this shaft, is now handled in this way. At present, we have in commission 4 electric locomotives and 36 steel cars of 2¾ tons capacity each, and are now preparing for the operation of 10 additional electric locomotives, recently ordered from the General Electric Company. The greater portion of rock mined will eventually be transported from the stopes and drifts by electric haulage.

"For further economical operation, appertaining to the tramming and hoisting of rock bins are being constructed on the hanging side of shaft, at the most productive levels. These bins are, approximately, of 500 tons capacity each. Several of them are now in commission, and are being successfully operated for filling skips direct, which is done in much less time, and is more satisfactory in every respect, than with tram cars. The present skips of 5¾ tons capacity each will be replaced by larger skips of improved design, of practically 8 tons capacity. Two of these skips are now in commission in No. 7 shaft. During the earlier part of the year, the old hoisting drum at No. 6 hoisting engine was replaced by the new steel drum ordered in 1901, which is giving excellent service.

"At our stamp mills several important changes and improvements have been completed, and others are under way, towards reducing the cost of stamping, and the saving of copper in the waste tailings. At No. 2 mill, the two-way mortar of one of the Allis heads was replaced, early in the year, by a round mortar, and the coarse system of stamping introduced, which has been the means of increasing materially the stamping capacity of each head, and reducing the cost per ton of rock stamped. The remaining two heads (two-way mortar), have also been equipped with the coarse stamping appliances and an improved mortar discharge; the combination giving such entire satisfaction that we will, in the near future, similarly equip the five Allis two-way mortar heads in No. 1 mill. A No. 6 Chilean mill was recently installed with the necessary accessories for grinding and treating the coarse sands from the roughing jigs—known as the 'air discharge'—and which were formerly returned to stamp-head. From present indications it will be advisable to introduce similar grinding machines in No. 1 stamp mill.

"The new coal dock and coal hoisting plant at our stamp mill location, mentioned in former report, was completed during the past summer, in time to unload and handle about 70 per cent of the season's coal. The necessary railroad trestles to the different boiler plants at mine and mill, for transporting coal direct to boilers, were completed in the early summer. The unloading of all coal vessels with this new coal hoisting plant, and the transportation of coal to the mine and mill boiler houses over our own railroad, is done at a considerably less cost per ton than heretofore.

"At our smelting works, a substantial frame warehouse, 50 by 248 ft., was built for the storage of refined copper. We now have under consideration the erection of a suitable mineral house there, for the temporary storage and more economical handling of the mineral, the intention being to use cars instead of barrels for the transportation of all mineral from our stamp mills."

Tennessee Coal, Iron and Railroad Company.

This company owns extensive coal and iron properties in Alabama and Tennessee, with blast furnaces, steel works and other plant. Its report is for the year ending December 31, 1902.

The company has $248,300 preferred and $22,552,800 common stock. The bonded debt is $12,290,500, the sinking fund for its reduction amounting to $478,884. In addition the company guarantees $1,100,000 bonds and $440,000 preferred stock of the Alabama Steel & Shipbuilding Company. The working capital, furnished by cash and bills receivable, amounted at the close of the year to $2,284,142.

The net earnings for the year showed an increase of $939,109 over the previous year. The income account may be summed up as follows:

Net earnings from operation	$2,649,063
Interest, etc.	7,684
Total	$2,656,747
Interest	$750,283
Taxes	53,968
Royalty and replacement funds	419,537
Total deductions	$1,223,788
Net balance	$1,432,959
Add appreciation of property	375,666
Total	$1,808,625
Dividends on preferred stock	$23,175
New construction	1,371,942
Total	$1,395,117
Balance	$413,508

The royalty and replacement funds are formed by sums set aside to represent or replace ore and coal mined and coke made; and to cover also depreciation of plant and equipment. The sum given above for appreciation of property represents improvement in values of properties sold over their inventoried cost, less premium on the company's bond bought for the sinking fund. The expenditures for improvements and additions included $707,244 for new construction at mines; $363,018 for new construction at mills; $194,698 for new work at furnaces; $45,602 for new mining plant; $60,925 for explorations and surveys, and $454 miscellaneous. The final balance of $413,508 was applied to reduction of inventory value of plant account.

The report of Mr. Don H. Bacon, president, gives the following interesting summary of work done and in progress:

"The efforts of your directors and officers have been largely given to the putting of your properties in shape for economical production. Considerable has been accomplished in this direction and much remains to do. Since 1899 this company has owned a furnace plant at Sheffield, Alabama, and a comparatively small ore-body. Additional boilers, engines and other equipment were needed at the furnaces, but the outlay was not warranted by the ore at command, and to acquire a quantity sufficient to last for many years would have meant a large investment. The distance was too great to permit shipments from your ore mines near Birmingham, and it was necessary to supply coke from the Birmingham District, with a rail movement of 139 miles. Your directors therefore sold your Sheffield property, and will use the money toward the erection of new furnaces at Ensley, where both coal and ore are abundant and in close proximity. It has been decided to erect immediately a large furnace at Ensley, and later to replace four of the stacks now there with others of much greater capacity. The new furnaces will have ample boiler, stove and blowing power; they will have bins for ore, stone and coke, skip-hoists, and other labor-saving devices, and will be up to date in design and detail. A water purifying plant has been placed in service at the Ensley furnaces and has reduced the fuel consumption, increased the efficiency of the boilers, and decreased the repairs heretofore necessary. Your Oxmoor Furnaces were idle from March, 1901, until November, 1902, since which date one stack has been in blast.

"Coke oven gas, which has heretofore been a waste product at nearly all of our ovens, is now used to make steam for hoisting and pumping, and will soon steam the boilers that are to run the electric power and light station, now being constructed to supply all of our furnaces, mills and shops at Ensley. Generators and motors have been ordered for the equipment of some of your coal mines with electric haulage and light, and at other coal mines, hoists, boilers and compressors are being placed.

"Your iron mines on Red Mountain are being equipped almost throughout with compressors and hoists of the best design, the former with power far beyond those now in use, and the latter with rope capacity for hoisting ore from a depth of 4,500 ft. It was found necessary to discard nearly all of the boilers because of their weakness. New boilers, that are ample in power and economical in the use of fuel, are now in place. The water for the supply of the boilers and for general use on the mining locations is pumped for a distance of nearly a mile, and it was necessary to lay pipes of larger capacity than those heretofore in use, and to set up new boilers and pumps. Before the end of the present year these mines will be prepared to make a larger product than heretofore, and at a greatly reduced cost. Machine and blacksmith shops have been erected at the iron mines, in which is now done the work that has heretofore been done at some distance, at great cost, and often at a serious loss, by reason of delay. A number of dwellings have been erected, so that our employees may be more comfortably housed. Hospitals have been built, at which our employees receive as prompt and skillful attention as is provided by the most careful employer. It is the intention to offer the advantages of the hospitals and of the services of the surgeons and physicians to our employees at the Bessemer and Oxmoor furnaces. On land owned by this company at Greeley, 27 miles from Birmingham, large bodies of brown ore have been opened, and shipments from them to your Birmingham furnaces will be increased. A steam shovel is used for removing the dirt that overlies the ore, which largely reduces the cost. Later, a shovel will be used for mining, and a saving effected thereby. With better methods, a reduction in the cost of mining limestone, amounting to 24c. per ton, has been effected, and it is believed a further reduction is possible. At nearly all of the iron mines on Red Mountain new crushers have been placed. The ore supplied to the furnaces is now of proper size, the consumption of coke per ton of pig iron has decreased, a larger percentage of the higher grades of iron is produced, and more uniform furnace operation has been secured.

"At South Pittsburg, Tenn., this company owns furnaces, and at Tracy City and Whitwell—the latter is but 18 miles from South Pittsburg—coal mines containing large amounts of coking coal, but no ore supply had been secured, it being the custom to buy ore. A steady supply was uncertain, and the cost was often excessive. Your officers, therefore, bought in November last a tract of land containing sufficien ore to supply the South Pittsburg furnaces for many years, the equipment of which will be strengthened so that operations may be more economically conducted.

"The product of your steel mill has been materially increased, and the errors in design and construction are being corrected as rapidly as possible, but at large cost both of time and money. During the past month the rail mill has been successfully operated, and we are prepared to furnish rails of all standard sections. Those already rolled are of excellent quality.

"Explorations with diamond drills, for the purpose of determining the quantity of raw material owned by this company, are being conducted, the results of which up to date have been satisfactory. The quantity of ore and coal acquired during the past year, by the purchase of fee lands, is approximately equal to the quantity removed. As stated in the report of last year, for each ton of coal and ore consumed or sold, a sum is charged which will, before the exhaustion of your property, extinguish the value of the real estate as it now appears on the books.

"Competent men are giving careful attention to the production of coke, with the result that the percentage of yield has increased, the quality improved, and the quantity consumed per ton of pig iron made has been lessened. Changes and improved practice at several of your furnaces have resulted in the largest and most uniform product recorded."

BOOKS RECEIVED.

In sending books for notices, will publishers, for their own sake and for that of book buyers, give the retail prices. These notices do not supersede review in a subsequent issue of the ENGINEERING AND MINING JOURNAL.

Report of the National Academy of Sciences for the Year 1902. Alexander Agassiz. Washington; Government Printing Office. Pages, 42.

Journal of the Mining Society of Nova Scotia. Volume VI, 1901-1902. Edited by H. Piers. Halifax, N. S.; published by the Society, Pages, 116; illustrated.

Analysis, Detection and Commercial Value of the Rare Metals. By Dr. J. Ohly. Denver, Colo.; The Industrial Printing and Publishing Company. Pages, 216; price, $3.

State of Washington. Report of the State Inspector of Coal Mines. 1901-1902. C. F. Owen, Inspector. Seattle, Wash.; State Printers. Pages, 60; with maps and illustrations.

Geological Survey of Canada. Annual Report of the Section of Mines for 1901. By Elfric Drew Ingall. Ottawa; Public Printer. Pages, 160; with diagrams. Price, 25 cents.

Die Stellung der Mineralogie und Geologie an den Technischen Hochschulen. By Dr. K. Oebbeke. Munich, Germany; Reprinted from the *Allgemeine Zeitung.* Pamphlet, 20 pages.

Technical Education and the Higher Industrial Life. By H. F. J. Porter. Address Delivered on Founder's Day of the Thomas S. Clarkson Memorial School of Technology, Potsdam, N. Y. Pamphlet, 8 pages.

Elements of Steam Engineering. By H. W. Spangler, Arthur M. Greene, Jr., and S. M. Marshall. New York; John Wiley & Sons. London; Chapman & Hall, Limited. Pages, 280; with 273 illustrations. Price, $3.

Twenty-fifth Annual Report of the Bureau of Statistics of Labor and Industries of New Jersey. For the Year Ending October 31, 1902. William Stainsby, Chief of Bureau. Trenton, N. J.; State Printers. Pages, 504.

Outlines of the Geology of Japan. Part III. Economic Geology. Compiled by the Officials of the Geological Survey of Japan. Tokyo, Japan; published by the Geological Survey. Pages, 254; with Atlas in 15 sheets.

The Foreign Commerce and Navigation of the United States for the Fiscal Year Ending June 30, 1902. *Volume I.* Prepared in the Bureau of Statistics, Treasury Department. O. P. Austin, Chief of Bureau. Washington; Government Printing Office. Pages, 932.

Bulletins of the Mines Department of Tasmania. Report on the Western Silver Mine, Zeehan. By George A. Waller. Pages, 18; illustrated. *Report on the Den Hill Gold Deposits.* By W. H. Twelvetrees. Pages, 8. *Report on the Tin Ore Deposits of Mount Heemskirk.* By George A. Waller. Pages, 48; with maps. *Progress of the Mineral Industry.* By W. H. Twelvetrees. Pages, 20. Hobart, Tasmania; Government Printer.

BOOKS REVIEWED.

A Course in Qualitative Chemical Analysis. By Dr. F. P. Venable. Fourth Edition. Revised by Dr. Alvin P. Wheeler. New York; the University Publishing Company. Pages, 54.

A valuable little book for the student of elementary inorganic chemistry. Part I deals with the dry tests to be made on simple compounds, explaining in each case the behavior of the salts, while Part II describes the wet methods of chemical analysis for the determination of the bases and common acids. In many cases the reactions are expressed by equations, so that the student can follow the changes which take place. Having described a number of tests for the identification of a single salt, the author proceeds with the systematic examination of a more complex compound. The several precautions to be taken in making an analysis are emphasized, thus making the book a great help to the inexperienced.

Notes on the Estimation of Copper by Potassium Permanganate. By H. A. Guess. Reprinted from the *Journal* of the American Chemical Society. Pamphlet, 4 pages.

The author has devised a method whereby the awkward and cumbersome process of filtering the precipitated cuprous thiocyanates with asbestos filters and filter pumps is improved upon by using well extracted filter papers. The action of the hot alkali is very slight, and is constant for the same class of paper. He claims that for small or fractional percentages of copper, his method is far superior to the iodide titration and is just as rapid.

The New Zealand Official Year Book, 1902. Eleventh Issue. Prepared by E. J. Von Dadelszen, Registrar General. Wellington, New Zealand; Government Printer. Pages, 696; illustrated.

This latest issue of the *New Zealand Year Book* contains a condensed summary of information relating to the Colony, its agricultural, mining and other industries, its inhabitants and their condition. Most of the information is necessarily given in tabulated form, but the proportion of descriptive text is much larger than in previous volumes. Besides a general description of the islands, the book contains reports upon population, education, agriculture, mining, manufactures, transportation, lands, taxation and government revenue and expenditures. There are special articles also on the land system of the Colony, which will be interesting to many readers, since it is well known that New Zealand has been a pioneer in experimental legislation in this direction. Another special article refers to the labor laws, while there are brief chapters describing different districts in the island, especially those in which there are large tracts of government lands open to settlement.

Theorie des Moteurs a Gaz. Conferences Faites a l'Automobile Club de France. By George Moreau. Paris, France; Ch. Beranger. Pages, 224; with diagrams.

This volume gives the results of a series of conferences which were held under the auspices of the Automobile Club of France, though the engineers who took part in these discussions were not all connected with that club. It is, as the title indicates, a general discussion of the theory of the gas motor, and with some notes on the different classes of motors, and the results obtained from them. The different chapters have a general introduction, describing briefly the different classes of gas motors, notes relating to the principles of dynamics, the theory of gas motors, the value of the different theoretical cycles and the operation of motors. A considerable part of the volume is rather abstruse, especially the chapters on thermodynamics and the theoretic value of the different cycles. In both of these resort is had to the higher mathematics, and the statements and formulas given are worked very fully. The whole book is theoretical rather than practical, but it will doubtless interest those who wish to follow that side of the subject.

Society for the Promotion of Engineering Education. Proceedings of the Tenth Annual Meeting, 1902. Edited by Robert Fletcher, Calvin M. Woodward and Clarence A. Waldo, Committee. New York; *Engineering News* Publishing Company. Pages, 300; illustrated. Price, to members, $1.50; to libraries, $2; to others, $2.50.

The present volume contains the list of officers and other information about the association, together with the papers read at the latest annual meeting in Pittsburg. These papers cover a considerable range of subjects and many of them are of great value. The discussions on the lecture system, on the differentiation of engineering courses and methods of grading students, are particularly interesting. In addition to the proceedings the present volume contains two features which have not appeared in former volumes; one is the statistical report on the present status of engineering education in the United States, Canada, Australia and England. There are some omissions so far as the United States are concerned, largely incident to a first report, but otherwise that portion is substantially correct. The other special feature is the combined index of the ten annual volumes previously issued by the society, now making available what is probably the largest and most important single collection of essays and discussions in the English language on the subject of engineering education.

A Text-Book of Field Astronomy for Engineers. By Prof. George C. Comstock. New York; John Wiley & Sons. London; Chapman & Hall, Limited. Pages, 212; illustrated. Price, $2.50.

This book, as its title indicates, is not designed for students who devote themselves to astronomy, but for the large class of engineering students to whom a knowledge of the elements of practical astronomy is necessary. With this idea in view the author has selected that part of astronomical practice most closely related to the work of the engineer. The limitations of time assigned to this subject had to be considered and this made it necessary to make only brief allusions to many matters which are of primary importance to those who study astronomy as a science. The portions of astronomical practice chiefly treated are the training in the art of numerical computation, training in the accurate use of such typical instruments of precision as the sextant and theodolite, with especial reference to the elimination of errors from the results of observation, and determination of time, latitude and azimuth with portable instruments has furnished subject matter through which the first and second subject may be conveniently studied.

The object of the book has been well carried out, and it seems to be very well adapted for the use of students and engineers. We may add that the first chapter is devoted to the elements of spherical trigonometry, which seems to be necessary in view of the fact that comparatively very little attention is given to the subject in most of the courses in engineering schools.

CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.
Letters should be addressed to the MANAGING EDITOR.
We do not hold ourselves responsible for the opinions expressed by correspondents.

Gold Mining in Maine.

Sir.—About ten days ago I sent you a copy of the Westbrook (Me.) *Chronicle and Gazette,* which contained an advertisement describing our mining prospects in Milton Plantation. I sent you this notice, thinking that you would be interested to get the news from this part of the country, and I also thought that you might like to look us up in the spring, to investigate our property and see for yourselves whether we had all we claimed to have, or simply another scheme. I did not expect to see in your next issue, very prominently placed in your editorial column, what I term an uncalled for attack on our company. Without looking us up or investigating our property in any way whatever you took the liberty to compare the company and the property with the Bubonic plague and Jernegan's salt-water scheme. As to the officers of this company, we will refer you to the Rumford National Bank, or the Rumford Falls Trust Company. The property is exactly as we claim in every detail, and if you will take the trouble to send a representative here after the snow is off, we will pay his expenses, and if you find that we have misrepresented the property in any way, you may publish all the epithets

and slurs you may think we deserve. None of the officers of this company are schemers or promoters, but we are very much interested in Maine's mineral resources and honestly think that we have a very valuable property. If we had a scheme, we should have capitalized our property for more than $300,000. We are depending upon Maine men for 90 per cent of our working capital, and expect every purchaser of stock to visit the property at our expense and see for themselves. You speak of the development work on our property being done by the "Herculean labors of six miners." I will say this, that the State of Maine is flooded with representatives of Western mining companies offering stock from 10c. to $1.50 per share, and a majority of them have not one-half the development work done that we have, and, in my judgment, not one-hundredth part of the prospective value that we can show. You probably think in your hasty conclusions that there is very little gold in the State of Maine. Ten miles from here gold has been taken from the Swift River by panning in paying quantities for the past fifteen years. Farmers there that never saw a gold pan, go there occasionally and wash out from $2 to $5 in a day, almost anywhere for a distance of five miles on this river. There is a brook in Rangely, Me., where a good placer miner can make $2 or $3 per day on an average, as long as he cares to work. There was a single nugget taken from Swift River a few years ago that weighed over $19 in value. Nuggets weighing one-quarter of an ounce are not rare. These facts you can easily verify. I have spent seven years in this part of Maine doing nothing but prospect for mineral, and in that time have located and sold the largest deposit of mica ever found on this continent. Have found large deposits of sienna, or oxide of iron, that equals the best grade of Italian. There are 3,000 acres in one tract here that carry from $4 to $6 per ton in nickel on the surface, but as to its being a proposition that will ever pay to work, I am not prepared to say. There are large deposits of zinc here (blackjack) that assays 40 per cent zinc as it comes from the shaft. This is nearly a pure blende, containing no lead and only a trace of iron. We expect to get the State to make an appropriation, through the legislature that is now in session, for a thorough geological survey, and we hope in the near future to be able to confront you with a few facts that you will not ridicule.

The last survey made was in 1836 by Prof. Jackson, a man of great talent in his day, and a member of nearly, if not all, the geological societies in the world at that time, and he speaks very highly of the mineral resources of Maine. He thinks you have done an injustice by your hasty conclusions, and in fairness to ourselves and the public we would like to have you print this statement as our side of the case.

W. N. McCrillis,
General Manager, Mount Glines Gold and Silver Mining Company.
Rumford Falls, Me., Feb. 18, 1903.

QUESTIONS AND ANSWERS.

Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc.; preference will be given to topics which seem to be of interest to others besides the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents. While names will not be published, all inquirers must send their names and addresses. Preference will, of course, always be given to questions submitted by subscribers.

Suspending Plummets.—What liquid or oil is considered best in which to suspend plummets for carrying the line of sight down a vertical shaft or lining a building?—G. J. L.

Answer.—The plummet is generally immersed in water. Lubricating oil is sometimes used in deep shafts in order to lessen vibration.

Receptacles for Liquid Air.—Would you state what class of receptacles are used for storing or transporting liquid air from place to place?—G. J. L.

Answer.—Liquid air is transported in Dewar vacuum bulbs, which are of glass. One globe is contained within another, the intervening space is exhausted of air, the whole is packed in felt and contained in a leathern case. The opening of the bulb is simply covered with a piece of felting. The Columbia Liquid Air Company, of Washington, D. C., supplies liquid air in small quantities for experimental purposes.

Smelting Silver Ores.—In what way could I smelt with safety, ore assaying from 200 to 400 oz. per ton, in a blast furnace, when 50 per cent of the silver content consists of chloride of silver or other volatile silver compounds?—X. Y. Z.

Answer.—Ore of the kind mentioned can hardly be regarded as being very high grade. It is commonly fed in the furnace, mixed with other ores of the charge.

Reducing Cement Copper.—We have a vein outcropping above the surface and carrying copper sulphide. We have reduced the copper sulphide to cement copper and find the ore running about 20 per cent metal. Please tell us the best flux or fluxes to use in our laboratory for reducing the cement copper in a crucible to a metallic state.—R. G.

Answer.—Assuming that by cement copper you mean copper deposited in metallic form, it can be melted down in a crucible at the highest temperature of a wind furnace, using a cover of borax and a little charcoal.

Metric Assays.—How does the method of reporting an assay in Mexico differ from that used in the States, and what figure is used in changing a regular assay into that of the metric system, which I understand is compulsory in Mexico?—A. B. C.

Answer.—As the metric system is compulsory in Mexico, assay reports must be made in grams of gold or silver to the metric ton of 1,000 kilograms. For copper, lead, etc., of course, the report can be made in percentages. The conversion of weights can be made by any of the tables of the metric system which are in common use and in general circulation. In Aaron's "Assaying" you will find some tables giving the metric calculations for assays and similar tables can be found in other works on assaying. In making metric assays, matters are very much simplified by taking the metric assay-ton as shown in Aaron's book.

PATENTS RELATING TO MINING AND METALLURGY.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by the Engineering and Mining Journal upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the Journal in which notice of the patent appeared.

Week Ending February 24, 1903.

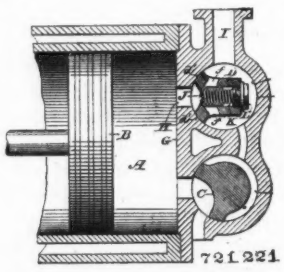
721,207. ROTARY PUMP.—James B. C. Lockwood, Seattle, Wash. A pump, comprising a case having a central induction and a tangential discharge opening; an annular shoulder upon the end opposite said induction opening; a runner concentric of said case and provided with tangentially disposed curved blades; a shroud upon each of the opposite longitudinal ends of said blades; a ring secured to the external surface of each shroud in proximity to its inner periphery; curved vanes extending from said rings to the outer periphery of said shrouds; liners covering the entire inner surfaces of said casing, said liners comprising a peripheral casing lining, a disk lining upon surface opposite said induction opening; a two-part liner for said opening, the inner part of said induction lining and corresponding surface of said disk lining being respectively even with inner surfaces of adjacent said runner shrouds, a concentric liner upon each of said casing covers and severally provided with a ring adjacent to their inner peripheries and contiguous with said rings of the shrouds; and the last-named rings.

721,208. CRUSHING ROLL.—William C. Madge, Anaconda, Mont. In a crushing roll, the combination, substantially as set forth, of a core provided with a continuous peripheral groove and with a circular series of transverse mortises crossing the groove, a series of shoes engaging the periphery of the core and free of initial end contact with each other and provided with mortised flanges engaging the groove of the core, and tapering keys extending through the mortises of the core and shoes and engaging the inner end walls of the mortises in the shoes and the outer walls of the mortises of the core and clearing the inner walls of the mortises of the core and the outer walls of the mortises of the shoes.

721,209; 721,210; 721,211; 721,213 and 721,214. ART OF ROLLING TUBES.—Max Mannesmann, Remscheid-Bliedinghausen, Germany. The art of rolling a hollow blank or billet between two or more rolls and a mandrel which consists in subjecting the blank to the action of positively-driven rolls and a longitudinally-actuated mandrel simultaneously with the squeezing action of the edges of the rolls, whereby a relatively large reduction of the blank and a stretching of the same in a longitudinal direction into a tube with longitudinal ribs or feathers is produced.

721,212. MACHINE FOR ROLLING TUBES.—Max Mannesmann, Remscheid-Bliedinghausen, Germany. In a mechanism for rolling tubes the combination of a set of positively driven rolls, provided with means for producing longitudinal ribs, ridges or feathers, on the blank during the rolling operation, and appliances for working down said ribs or feathers and enlarging the circumference of the tube on the mandrel.

721,221. DISCHARGE VALVE FOR COMPRESSORS.—Bruno V. Nordberg, Milwaukee, Wis., assignor to Nordberg Manufacturing Company, Milwaukee, Wis. In a pump or compressor the combination with a cylindrical valve chamber communicating with the pump chamber through the discharge port thereof and having an outlet port, of an



oscillatory discharge valve having cylindrical bearings at the ends fitted in said chamber, and a longitudinal working face spanning the cylinder exhaust port when the valve is closed said valve being cut away outside of its working face between its end bearings so as to leave a space between it and the inner wall of the valve chamber, and formed with passages leading through its working face into said space, and outwardly opening spring-closed relief valves seated in said passages.

721,282. PROCESS OF TREATING MOLTEN IRON.—Hugo Buderus, Hirzenhain, Germany. A process of improving the quality of molten iron from blast furnaces for the production of castings and maintaining it at the temperature required for casting, which consists of first introducing molten slag into a mixing chamber, then introducing fuel therein above the molten slag to raise the temperature of said chamber and maintain the slag in a molten condition, then introducing the molten iron from the blast furnace, and, during the continued introduction of fuel above the molten slag, introducing and mixing with the molten iron material necessary to improve its quality, and finally conveying the molten iron from the chamber to molds to form castings.

721,288. APPARATUS FOR RECEIVING AND HANDLING MOLTEN MATERIALS.—Paul Danckwardt, Deadwood, S. D. An apparatus for handling molten materials, composed of a wheel-mounted pot having a back, and sides that are projected above the back.

721,293. APPARATUS FOR THE DISINTEGRATION OF METAL.—Maximilian J. Fuchs, Stamford, Conn., assignor to the Baer Brothers, New York, N. Y. An apparatus comprising a tank, a pipe for projecting a stream of water therein, said pipe having a single discharging orifice of angular shape, whereby the steam projected from said pipe is of solid angular cross-sectional area, means for guiding molten metal to said stream to be intercepted by the latter and supported thereby, and an impinging surface arranged in said tank opposite to said pipe and against which the molten metal is forced by said stream for granulating said metal.

721,300. DUMP CAR.—Egbert D. Haven, San Jose, Cal., assignor of one-half to James H. Crosett, San Jose, Cal. A car body pivoted and tiltable from side to side upon its truck or wheeled frames, longitudinally disposed spiral channels fixed to the car body and having the same center of motion, slides and guides upon which said slides are movable longitudinally with relation to the spiral grooves, rollers carried by the slides adapted to travel in the grooves and means for moving the slides and rollers longitudinally to move the spirals and tilt the car body.

721,311. PROCESS OF SMELTING.—Emil Knudsen, Sulitjelma, Norway. A method of treating ores, which consists in first imparting to the lining of the furnace a high degree of temperature, then introducing to the furnace the full charge of ore, then admitting a cold-air blast to the charge at a low pressure thereby initiating the smelting of the charge and subsequently increasing the pressure of the blast, causing thus the smelting and concentration of the charge without the addition of carboniferous fuel.

721,323. DUMP CAR.—Caleb D. Page, Greeley, Colo., assignor to Page Car Company, Boston, Mass. In a car, a

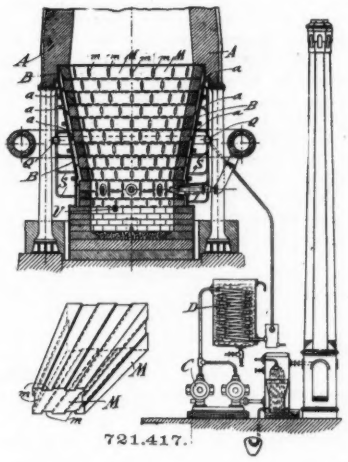
fixedly supported body having longitudinally braced frames rising from the ends thereof, combined with one or more tipping boxes pivotally supported on said body between said frames.

721,333. APPARATUS FOR AUTOMATICALLY DISCHARGING BUCKETS.—William P. Sherman, Willoughby, Ohio. In combination, a body adapted to support a bucket, a rotatable cam, a longitudinally guided member which may engage said cam, means whereby said member may rotate about a pivot and a lever actuated by said rotation.

721,336. CAR CONVEYER.—Harry J. Smith, Philadelphia, Pa. A car conveyer comprising in combination a car, inclined conveyers fixedly secured to the upper structure of the car and slidable conveyers depending from the ends of the fixed conveyers and adapted to be folded over the fixed conveyers.

721,381. CASTING MACHINE.—William A. McAdams, Brooklyn, N. Y. In combination, a mold, a pressure chamber, a gate through which communication is established between the pressure chamber and mold, means for holding molten metal in position to enter the gate, and means for supplying fluid pressure to the chamber, the said mold being provided with an air passage independent of the gate for admitting fluid pressure to the interior of the mold during the pouring of the metal.

721,417. BLAST FURNACE.—Rudolf Berg, Pittsburg, Pa., assignor of one-half to Ferdinand Wenig, Pittsburg, Pa. In



a blast furnace, the combination with the boshes and tuyeres of the same, of means for supplying compressed and cooled air to the boshes and tuyeres, and through the same to the interior of the blast furnace.

721,418. APPARATUS FOR PREVENTING TOP EXPLOSIONS IN BLAST FURNACES.—Rudolf Berg, Pittsburg, Pa., assignor of one-half to Ferdinand Wenig, Pittsburg, Pa. In a blast furnace, the combination with the coke and ore chamber at the upper part of the blast furnace, of means for supplying compressed and cooled combustion gas to said chamber.

721,431. GUIDE FOR INSIDE TUBES OF BLASTING CARTRIDGES.—Thomas F. Durham, Philadelphia, Pa. In a safety blasting cartridge an inner and outer tube, means for holding the inner tube at a distance from the outer tube, said means consisting of a band or strip bent into a polygonal form and surrounding the inner tube, the angles or corners formed by the bending of the strip adapted to protrude beyond the inner tube and come in contact with the inside of the outer tube.

721,432. BLASTING CARTRIDGE.—Thomas F. Durham, Philadelphia, Pa. In a safety blasting cartridge an outer tube closed at one end, said closed end being formed tapering or conical, an inner tube closed at one end and open at the other end, plugs inserted in the open ends of both the outer and inner tubes, three or more longitudinal ribs formed with the inner tube, said ribs extending to the closed end of the inner tube and by engagement with the tapering or conical end of the outer tube holding said inner tube at a distance from the outer tube, said inner and outer tubes being molded from a fireproof material, a fire extinguishing agent surrounding the inner tube, and a fuse extending from the exterior of the outer tube to the interior of the inner tube.

721,458. MACHINE FOR CLEANING AND POLISHING TIN PLATES.—Wesley McCord and Thomas Gill, Lisbon, Ohio. The combination with a cleaning chamber containing curved guide tracks of a rotary conveyer concentrically mounted with relation to said tracks, radial fingers upon said conveyer for cooperating with the tracks aforesaid to advance plates through the cleaning chamber, and a suitable stop surmounting said conveyer for arresting the plates and delivering them from the conveyer.

721,467. ALLOY OF IRON AND TITANIUM.—Auguste J. Rossi, New York, N. Y., assignor of one-half to James MacNaughton, Tahawus, N. Y. A compound fusible under ordinary temperatures sufficient to melt iron or steel, and characterized by containing an important quantity of iron, some carbon, and titanium in industrially important proportions but fusible at the said temperatures, that is to say not less than 2 per cent and not more than 5 per cent of the mass.

721,478. APPARATUS FOR GENERATING AND BURNING GAS.—John C. Teller, Minneapolis, Minn. The combination with a roasting chamber of a combustion tube open at one end and closed at the other end, extending into said roasting chamber and provided with laterally projecting tuyeres and means for delivering into the open end of said tube commingled air and oil, under pressure.

721,489. PROCESS OF MAKING CITRATE SOLUBLE PHOSPHATES.—Wilhelm Wolters, Magdeburg-Buckau, Germany. A process of manufacturing citrate soluble phosphates by heating a mixture of natural phosphates, silicates of the alkalies and silicates of the alkaline earths to a temperature of not less than 1,200° C., at which the said materials are converted into a homogeneous mass of a fluid molten state which when cold is perfectly soluble in citrate solutions.

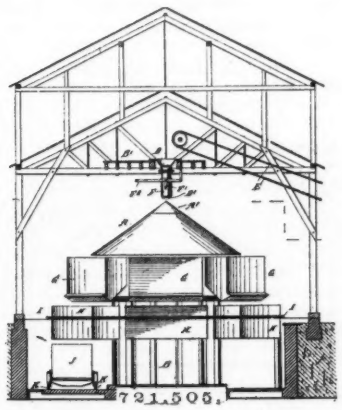
721,490. ELECTROMAGNET FOR SEPARATING METALS.—Geo. H. Young, Elmira, N. Y. An electromagnetic separator for hand manipulation comprising a steel or iron core of U shape having a spool of wire wound upon each leg thereof, the wire in said spools running from one spool to the other and the ends being carried through suitable cable to a source of current supply, the bend of the core piece forming a handle and a button or other switch located in proximity to said handle whereby the current may be switched on or off by the hand which grasps the instrument.

721,513. GAS PRODUCER.—Lucien Genty, Marseilles, France, assignor to himself and La Société Générale des Industries Economiques, Paris, France. In an apparatus for supplying a gas producer with a mixture of steam and air, the combination of a regenerator provided with a chamber, a boiler and a steam and air heating chamber, a producer provided with a gas generating chamber and a boiler communicating with the atmosphere, a connection between the producer boiler and the steam and air heating chamber, connections between the regenerator chamber and the said generating chamber, and a connection between the air and steam heating chamber and the gas-generator chamber.

721,519. COKE DRAWER.—William S. Jones and John P. Donohoe, Greensburg, Pa. A mechanical means for drawing coke, comprising a main frame, a support for the operator movable on the main frame to and from the oven, a scraper holder mounted on said support, and adapted to pull the scraper out with it as the support is moved away from the oven.

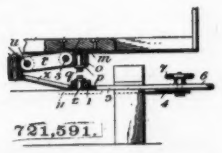
721,569. ROLLING MILL FEED TABLE.—Julian Kennedy, Pittsburg, Pa. A feed table having link and lever connections with parallel rock shafts extending parallel with the table, a link arranged to give parallel up-and-down movement to the table, and connections for rocking the shafts.

721,595. APPARATUS FOR FORMING BLAST FURNACE CHARGES.—Arthur S. Dwight, New York, N. Y. An apparatus for forming blast furnace charges, comprising a hopper, a cone upon the apex end of which said hopper



discharges, cartridge boxes into which the base of said cone discharges, and connected conveyers each receiving the contents of one of the said boxes and delivering the contents to a common place of discharge, and means for receiving and conveying the charges one at a time from the common place of discharge.

721,591. ORE CONCENTRATOR.—John H. Michelsen and Miller La Mothe Borglum, Butte, Mont.; said Michelsen assignor to John H. Curtis and Green Majors, Butte, Mont.

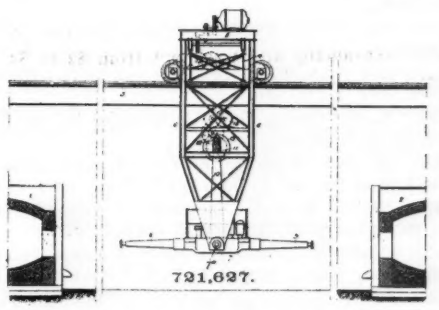


In an ore concentrator, the combination of a table, means for reciprocating said table, a lever mounted on the frame of the machine and movable thereon, and a link pivoted to the table, said lever and link being pivoted together in a substantially horizontal plane.

721,617. METHOD OF PURIFYING BLAST FURNACE GASES.—George J. Snelus, Frizington, England. A method of treating blast furnace gas, consisting in passing said gas through a mixture of hot fuel, small bituminous coal and a suitable flux, extracting the dust from said gas by forming with said dust and flux a fusible slag, enriching said furnace gas by the admixture therewith of the gaseous products from said bituminous coal, and converting the carbon dioxid contained in said furnace gas into carbon monoxid by the combustion of said carbonaceous fuel.

721,626. MANIPULATOR FOR FEED TABLES OF ROLLING MILLS.—Samuel T. Wellman and Charles H. Wellman, Cleveland, Ohio, assignors, by mesne assignments, to Samuel T. Wellman and Julian Kennedy, Pittsburg, Pa. The combination of a feed table of a rolling mill, with longitudinal guide bars and supporting structures whereby said bars are mounted above the feed table, racks on said supporting structures projecting laterally beyond the feed table, and shafts one for each bar, said shafts being arranged alongside of but laterally beyond and parallel with the feed table and having pinions engaging said racks.

721,627. FURNACE CHARGING MACHINE.—Samuel T. Wellman and Charles H. Wellman, Cleveland, Ohio, assignors to the Wellman-Seaver-Morgan Engineering Company, Cleveland, Ohio. The combination, in a furnace-



charging machine, of oppositely projecting charging bars, a structure carrying the same, and a traveling crane upon which said structure is pivotally mounted whereby swinging of said structure on its pivot will cause the raising or lowering of the outer end of either charging bar.

721,628. MANIPULATOR FOR FEED TABLES OF ROLLING MILLS.—Charles H. Wellman, Cleveland, Ohio, assignor to Samuel T. Wellman, Cleveland, Ohio, and Julian Kennedy, Pittsburg, Pa., trustees. The combination in a manipulator for rolling mill feed tables of a laterally movable longitudinal guide bar, a vertically movable bar or bars and a carrier guiding the same and connected to said longitudinal guide bar, and movable laterally therewith.

721,638. ART OF PRODUCING AND REFINING METALS, METALLOIDS AND ALLOYS.—Eugen Straub, Nuremberg, Germany. A process for treating metals, metalloids and alloys which consists in passing the vapor of the metal, metalloid or alloy under treatment through a fused zone of a combination of the said metal, metalloid or alloy with oxygen and condensing it.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy:

Week Ending February 7, 1903.

179 of 1902. DECARBURIZING CAST IRON.—B. H. Thwaite, London. Method of decarburizing cast iron articles by heating to bright cherry red and acting on them with an atmosphere of carbonic acid under pressure.

234 of 1902. ROASTING FURNACE.—A. Rabezzana, Castellazzara, Italy. A roasting furnace for ores consisting of a series of cells, distributing the ores equally and bringing them evenly into contact with the gases.

365 of 1902. MAGNETIC SEPARATOR.—A. E. Salaven, Grangesborg, Sweden. Improved arrangement of field magnets in magnetic separators.

1,170 of 1902. FURNACE CHARGER.—A. Pattinson, Cardiff. A system of overhead carriers for charging steel furnaces.

2,230 of 1902. ELECTRIC DRILL.—W. A. Box and E. Y. Sayer, Denver, Colo., U. S. A. Improvements on the mounting and driving mechanism of electrically driven hand rock drills, stone dressing tools, etc.

2,971 of 1902. IRON MIXER.—H. Buders, Hirzenhain, Hesse, Germany. Improved mixing chambers for preparing iron for casting direct from the blast furnace.

6,752 of 1902. ZINC PIGMENT.—V. Bermont, Paris, France. Preparing a sulphide of zinc suitable as a paint by dissolving carbonate in ammonia and precipitating by the addition of sulphide of soda.

19,895 of 1902. UTILIZING WASTE HEAT FROM ROASTING FURNACES.—A. Pfoser, Achern, Germany. A method of using the waste heat of calcining and smelting furnaces for steam raising.

22,906 of 1902. COKE CONVEYOR.—Simon-Carves Company, Manchester. Improved plant for removing and conveying coke from coke ovens.

TO ENGINEERS VISITING NEW YORK.

A room for the exclusive use of visiting mining engineers is maintained at the New York office of THE ENGINEERING AND MINING JOURNAL. Visitors to the metropolis are cordially invited to take advantage of the facilities it offers, by having their mail addressed in care of the JOURNAL and making its office their headquarters. The managers of the branch offices will also be glad to welcome visiting engineers and to be of any service to them that they can.

We are informed that the Institution of Mining and Metallurgy offers to all members of the American Institute of Mining Engineers non-resident in Great Britain, the privilege of free use of the Institution offices and library in Salisbury House, London Wall, E. C. Visiting engineers may have their letters addressed to the offices of the Institution and thus enjoy the advantages of temporary office accommodation in the city of London.

PERSONAL.

Mr. Ross Hoffman is at the Dolores Mine, Chihuahua, Mex.

Mr. W. H. Weed has lately returned from a trip to Mexico.

Mr. Ben Stanley Revett is staying at the Holland House, New York City.

Mr. A. C. Beatty has been retained by the Guggenheim Exploration Company.

Mr. H. W. Hardinge, of Denver, Colo., has returned from his trip to New York City.

Mr. Vivian Messiter, formerly of Denver, Colo., has secured a position in New York City.

Mr. Chester S. Batchelder, the well-known assayer, of Spokane, Wash., is now in New York City.

Mr. James McClashan has gone to the San Pedro Mine at Noxtepec, in the State of Guerrero, Mex.

Mr. H. V. Maxwell, mining engineer, of Dahlonega, Ga., has gone to Mexico on professional business.

Mr. Cecil G. Fennell, who is operating a custom smelter at Prescott, Ariz., is now in New York City.

Mr. W. Lawrence Austin returned from Butte, Mont., last week, and has left this week for Arizona.

Mr. Louis Noble, of Denver, Colo,, was in New York City recently, and has now gone to Oaxaca, Mex.

Mr. J. H. Kemp, of Boulder, Colo., has been in Gilpin County, Colo., looking after mining interests.

Mr. Franz Cazin, mechanical engineer, of Denver, Colo., has gone to Tacoma, Wash., on professional business.

Mr. J. W. Mercer is now at the Zaruma mines, of the South American Development Company, in Ecuador.

Mr. L. H. Jansen, of Colorado Springs, Colo., has just returned from an extensive professional journey to Mexico.

Mr. Godfrey Doveton and Mr. Chaster W. Purington have gone into partnership, with an office at Denver, Colo.

Mr. T. E. Schwarz, of Denver, Colo,, left a few days ago on a professional trip to the vicinity of the City of Mexico.

Mr. Arthur Winslow passed through Salt Lake, Utah, a few days ago on his way to Idaho on professional business.

Mr. O. Townsend has resigned as manager of the Baby McKee & Last Chance Consolidated Company, near Sumpter, Ore.

Mr. Frank Barrow sailed last week for South Africa on his way to Bulawayo, where he has obtained a good appointment.

Mr. E. G. Stoiber, Denver, Colo., former owner of the Silver Lake Mines at Silverton, Colo., has gone to Mexico on mining business.

Mr. A. H. Bromly has left London to proceed to Madras, India. He will investigate mining operations in the Kolar gold-fields.

Mr. W. A. Engley, of Attleboro, Mass., has been at Boulder, Colo., inspecting the Wall Street property, in which he is interested.

Mr. F. Cameron, general superintendent of the Utah Coal Company, at Castle Gate, Utah, has changed his headquarters to Salt Lake, Utah.

Mr. A. S. Watson, of Westfield, N. Y., has been looking at mining properties in the northern section of Gilpin County, Colo., during the past month.

Mr. R. L. Martin, a well-known mine operator of Gilpin County, Colo., has returned to Central City, after an extended business trip through Eastern cities.

Mr. C. P. Story, of Sheridan, Wyo., has been making a visit to the northern section of Gilpin County, Colo., looking at mining properties during the past month.

Mr. G. Wyman, who has been superintending development of the Animas Mine, of which he is part owner, at San Javier, Sonora, Mex., recently returned to Cleveland, O.

Dr. John H. Gower, a well-known mining operator of Gilpin County, Colo., has left Denver, intending to make a visit of several months to London, Eng., on mining business.

Mr. John B. Farish will return to Denver, Colo., from Minas Prietas, Mex., about March 15. He has lately become the executive officer and engineer of the Mines Company of America.

Mr. J. R. Anderson, of Pittsburg, Pa., a stockholder in the Northwestern Colorado Exploration Company, with interests in the northern sections of Gilpin County, Colo., has returned home.

Mr. Lewis B. Skinner has severed his connection with the United States Reduction and Refining Company as assistant superintendent, and accepted the superintendency of the Portland Mill at Colorado Springs, Colo.

Mr. F. A. Vogel, general manager of the Florence Iron River Mining Company, at Florence, Wis., has been appointed manager of the mining interests of Ladenburg, Thalman & Co., of New York, in the South and Southwest and in Mexico and Central America.

Mr. Frank Augustus, who has been traveling engineer for the Burlington Road, with headquarters at Centerville, Ia., has resigned his position to take charge of the mining operations of the Mountain Monarch Mining Company, operating in Gamble Gulch, Gilpin County, Colo.

Mr. E. E. Darling, who was severely injured by the explosion at the Edison Cement Works, at New Village, Pa., on March 2, was formerly superintendent of Columbia University, and had charge of the engineering work involved in erecting the new buildings of the University on Morningside Heights, New York City.

Mr. Charles S. Powell, who for the past 6 years has been manager of the Cleveland office of the Westinghouse Electric and Manufacturing Company, has been appointed assistant manager of the British Westinghouse Electric and Manufacturing Company, Limited, and has already entered upon the duties of his new position. His headquarters are in the Westinghouse Building, Norfolk Street, Strand, London, W. C.

Mr. E. Nelson Fell, of the firm of Pellew-Harvey & Fell, mining engineers, etc., of London, Eng., has just left for Siberia, with a staff of assistant engineers. The object of the mission is to continue on a much larger scale the exploration and development of copper and gold mines acquired in that country last year by the Siberian Syndicate, Limited, of London, for whom the firm named acted then as now, as consulting engineers.

OBITUARY.

E. D. Matteson, the man who devised the first rude outfit for working gravel beds by hydraulic process, died at Nevada City, Cal., on February 19. He was 80 years of age, and did the first hydraulicking in California, and in the world, in 1853. His first attempt was made with canvas hose and a barrel served as reservoir. Matteson did not dream what a revolution he had started in working gravel on a large scale. He died a penniless man, and the order of Native Sons is to erect a monument to his memory.

SOCIETIES AND TECHNICAL SCHOOLS.

SOCIETY OF ELECTRO-CHEMISTS AND METALLURGISTS.—At a recent meeting of the provisional committee of the proposed Society of Electro-Chemists it was resolved, in consideration of the support and encouragement received in response to the circulars recently issued, to hold a general meeting of the supporters of the movement, and formally inaugurate the work of the society and elect a president and council. The following gentlemen were nominated as members of council of the proposed society: President, J. W. Swan; vice-presidents, Prof. A. Crum-Brown, Sir Oliver T. Lodge, Ludwig Mond, Lord Rayleigh, Alex. Siemens, J. Swinburne; council, Geo. Bellby, Bertram Blount, A. G. Charleton, W. R. Cooper, Sherard Cowper-Coles, F. G. Donnan, Prof. A. K. Huntington, F. Mollwo Perkin, W. S. Squire, O. J. Steinhart.

ENGINEERS' CLUB OF PHILADELPHIA.—At the meeting on February 21 there were 135 members and visitors present.

The secretary announced that arrangements have been made to form a local chapter of the American Institute of Civil Engineers, which will meet in the clubhouse the second Monday of each month.

Mr. John W. Hill presented the paper of the evening on "Improvement, Extension and Filtration of the Water Supply of Philadelphia." The quality of the materials forming the filters proper was given, with the method of renewing and the average length of time between renewals. A feature of special interest was the preliminary filter or scrubber designed to clear the water before it entered the filters. The entire system is intended to operate without the use of alum or coagulants of any kind.

Mr. Hill stated that from tests and analyses of Schuylkill and Delaware water he was of the opinion that the Delaware was the preferable source of supply. Except for a slight vegetable stain, which is not at all deleterious, and which no ordinary sand filtration would remove, the Delaware water seemed to be in nearly every respect better than that from the Schuylkill. The large filtration plant was located at Torresdale in order to utilize as much Delaware River water as possible.

Samples were exhibited showing the standard of turbidity (6½ parts in 1,000) permitted in the new water supply for Washington, D. C., and 2 parts in 1,000 the standard adopted for the Philadelphia improvement. Mr. Hill estimates that the cases of typhoid fever will be reduced at least 80 per cent, when the filtration system is in complete operation. Taking up the question of bringing the supply direct from the headwaters of the Delaware, he stated that such sources were no longer considered safe unless the water was filtered. A general discussion brought out the fact that the new standard permitted 60 bacteria to 1 c.c., as compared with 100 to 1 c.c., the German standard, and some further details as to the operation of the filters and renewing and washing the sand.

At the business meeting, held February 7, Messrs. Walter F. Ballinger, Howard W. Du Bois, Julian O. Ellinger, J. Lawrence Hagy, E. P. Haines, John M. Hartman, Emile G. Perrot, A. G. Warren and David Thomas Williams were elected to active membership, Messrs. Holstein De Haven Bright and Carl Rossmassler to junior membership, and Mr. Walter B. White to associate membership.

INDUSTRIAL NOTES.

The Oil Well Supply Company, of Pittsburg, Pa., has made a substantial shipment of its specialties to the Dutch East Indies.

The Union Iron Works, of San Francisco, Cal., recently received a contract for a 40-stamp mill for the Fremont Consolidated Mining Company in Amador County, Cal.

J. Bartram & Sons, of Melbourne, S. A., have placed contracts for 2 De Laval turbine dynamos built by the De Laval Steam Turbine Company for installation at a plant in that Australian city.

The Lidgerwood Manufacturing Company, of New York City, has taken a contract from the New South Wales Government for 2 large hoisting derricks, which are intended to be used on the Sydney docks.

The Waterbury Wire Rope Company and the Brooklyn Wire Company, of Brooklyn, N. Y., have merged, and secured a New Jersey charter with $1,250,000 capital, as Waterbury & Co. The company is connected with the New York Steel and Wire Company, from which plant it receives its wire rods.

J. Bishop & Co., manufacturers of platinum ware, whose plant at Sugartown, Pa., was destroyed by fire a month ago, are now located at Malvern, Pa., where they have new works in operation. The firm states that it is better able to handle its business than ever before.

Dodge & Day, the modernizing engineers of Philadelphia, Pa., have been commissioned by the Ingersoll-Sergeant Drill Company to report on variable speed motor equipment for the new Phillipsburg plant, and have been awarded the contract to equip with motor drives a number of the large machine tools.

The Reading Iron Company is practically rebuilding its plant at Reading, Pa. Two new mills, one a pipe mill, are being built and a mill for making larger pipe is being planned. The company did a business of $15,000,000 last year, and has rebuilt two mills, a forge and a rolling mill within two years. A large power plant is being erected.

The Union Steel Screen Company, Limited, Battle Creek, Mich., expects to erect additional buildings next fall. The company makes heavy rotary or flat screens, sand screens, coal screens, cereal bolters, locomotive netting and spark arresters. These screens are manufactured under a patent, which covers the manner of fastening wires or bars in a new way.

At the recent annual stockholders' meeting of the Consolidation Coal Company, at Baltimore, Md., the following officers were elected: President, C. W. Watson; directors, Edward R. Bacon, Henry J. Bowdoin, George C. Jenkins, C. K. Lord, L. F. Loree, Oscar G. Murray, George M. Shriver, George A. von Lingen, J. H. Wheelwright and J. M. Quigley.

The Llewellyn Iron Works, of Los Angeles, Cal., is to be equipped throughout for driving by electric motors. Induction motors will be direct-coupled or belted to lathes, planers, and other machinery, and line shafting will be entirely done away with. The Pacific Light and Power Company has recently purchased from the Westinghouse Electric and Manufacturing Company for this plant 20 induction motors, ranging in size from 2 h.p. to 75 h.p., which are now being installed.

The Western Engineering and Construction Company, of San Francisco, Cal., is about to install a power-transmission plant for the operation of a gold dredge, at Atlin, B. C., 2 miles distant from the power plant. The electrical equipment will consist of 2 180-kw. belted alternating generators, the same number of induction motors, with controllers, and 2 induction motors for driving pumping machinery, etc. The Westinghouse Electric and Manufacturing Company will furnish the electrical equipment. The dredge, electrical machinery, etc., will cost about $150,000.

The Great Northern Portland Cement Company, of Detroit, Mich., has recently purchased from the Westinghouse Electric and Manufacturing Company, 23 direct-current motors, ranging in size from 5 h.p. to 50 h.p. These motors will be applied to driving cement machinery of all kinds. The Cleveland Hardware Company has recently purchased from the Westinghouse Electric and Manufacturing Company a 75-kw. and a 100-kw, 2-phase alternator ,together with exciters, switchboard, 10 20-h.p, motors and 2 10-h.p. motors. The plant is already in operation doing very satisfactory work. George S. Rider & Co. are the engineers.

The Ewing-Merkle Electric Company, of St. Louis, Mo., has just been organized by N. W. Ewing, Milton Mill, W. S. Merkle and W. G. Brown, all of whom have until recently been department managers of the Western Electrical Supply Company, of St. Louis, and have had a large experience in the electrical trade in the South, Southwest and West. The company has taken a long lease on a seven-story building at 1106 Pine Street, and already stocked it with a complete line of electrical apparatus and supplies of every kind. The company has ample capital, a large corps of traveling men and experts in the different departments.

The Allis-Chalmers Company will remove its general offices in Chicago, Ill., on May 1 from the Home Insurance Building to the New York Life Building. The new offices will provide ample space for the various sales departments and general business offices which will insure the best service. In the past 2 months orders for either engines, mining machinery, rock crushing machinery, sawmill machinery, or flour mill machinery were booked from every State in the Union, besides England, South Africa, Mexico, Canada, Chile, Central America, Brazil, West Australia, Turkey, Finland, Yukon Territory, Belgium, British Columbia, Bolivia, Hawaiian Islands, Peru, Alaska, China, and the Philippine Islands.

The General Pneumatic Tool Company, recently incorporated, is a reorganization of the business of the machinery department of the Havana Bridge Works, Montour Falls, N. Y., which has been engaged for some years in the production and sale of improved pneumatic tools. The new corporation will manufacture pneumatic tools, compression riveting machines, pneumatic motor hoists, air compressors, cranes, etc. Extensive improvements in the manufacturing plant have already been made, and an engine 1orse will be erected early in the spring. A portion of the new machinery is already in operation, but screw machines, turret lathes, shaper, universal grinder, gear cutter, milling machine and engine lathes are to be purchased. The company states that its tools have received gratifying recognition, and orders for compression riveting machines, pneumatic hammers, and pneumatic motor hoists, covering its capacity for several months, are already booked. Several new types of compression riveting machines have recently been brought out, in addition to those which have been on sale for several years.

The Chicago Pneumatic Tool Company, of Chicago, Ill., states that if the amount of business transacted for February is any indication, 1903 will be a banner year for the pneumatic tool business. Orders received for February show an increase of over 50 per cent over February, 1902. This has necessitated the removal of the plant at Aurora, Ill., to Cleveland, O., and its consolidation with the plant there. The following are a few of the installations of pneumatic machinery made during the week ending February 28: Moran Brothers Company, Seattle, Wash.; William Cramp & Sons Ship and Engine Building Company, Philadelphia, Pa.; International & Great Northern Railway, Palestine, Tex.; American Can and Foundry Company, Detroit Plant, Detroit, Mich.; Canadian Bridge Company, Walkersville, Ont.; Standard Oil Company, Brooklyn, N. Y.; Lehigh Valley Railway Company, Buffalo, N. Y.; American Shipbuilding Company, Cleveland, O.; Brooklyn Heights Railway Company, Brooklyn, N. Y.; William Wharton, Jr., & Co., Philadelphia, Pa.

TRADE CATALOGUES.

Catalogue No. 11, a new price-list of 20 pages, issued by the Tellerday Steel Pipe and Tank Company, of Waterloo, Iowa, describes that company's specialties in steel sheet work. The company carries in stock and builds to order boilers, tanks, steel pipe, etc.

An illustrated pamphlet sent out by the International Correspondence Schools, of Scranton, Pa., entitled "1,001 Stories of Success," contains names and addresses of persons all over the United States and even in Canada and Mexico, who have found help and profit in taking some of the many courses offered by the school.

A pamphlet recently published by the Jeffrey Manufacturing Company, of Columbus, O., as Catalogue No. 75, describes the Barney brick-conveyor for use at brickyards. This conveyor is stated to be of simple construction, to have a capacity of 5,000 to 35,000 bricks per hour, to save 25 per cent to 50 per cent in the cost of handling and to reduce the breakage of bricks to a minimum.

Catalogue No. 4, published by the Allis-Chalmers Company, of Chicago, Ill., is on chlorination, cyanide and lixiviation plants. The cyanide process is briefly described, and many hints are given on various details, including the description of some of the largest cyanide plants in this country. The chlorination process is also described as is the lixiviation of silver ores. The balance of the pamphlet is given to mention of crushers, ore-feeders, dryers, roasting furnaces, screens, etc.

Northern direct-current generators are briefly illustrated in a little circular sent out by the Northern Electrical Manufacturing Company, of Milwaukee, Wis. These generators are built in all standard sizes in belted and engine types, to be driven either by a steam or gas engine. The engine type generators are designed to meet the convenience of the engine constructor, making the assembling of the field or armature, when occasion requires, an easy job. In size they range from 2 to 25 kw.

The Wickes Brothers exhaust steam heater and purifier is described in a 32-page pamphlet sent out by Wickes Brothers, of Saginaw, Mich. The pamphlet describes the impurities of water, the effects of incrustation upon boilers, the best methods of preventing incrustation, and the economy of delivering highly heated water to a boiler. The Wickes feedwater heater is described as of simple construction, and is easily cleaned. It is made in all sizes desired, and can be adapted for almost any condition of height or floor space, or for nearly any water storage capacity.

The Plunger Elevator Company, of Worcester, Mass., building direct-acting elevators, has just got out a new catalogue. The Plunger elevator consists of a cylinder set vertically in the ground under the car and of length equal to the run of the elevator. In this cylinder works a plunger of hollow steel tubing from 4½ to 8½ in. in diameter. The particular merits of this elevator are simplicity and safety, there being nothing except the packing to wear and the car always being supported from beneath. The elevator has been installed in large hotels, office buildings, stores and manufacturing establishments in many different cities.

The Robinson ventilating fan, stated to be the latest and most approved type of mine ventilators, is constructed entirely of iron and steel. The sides or housings are massive castings, as are the cones and spiders. A central disk of steel, to which the cones and the inner edges of the vanes are attached, greatly strengthens the vanes. These are of sheet steel, so shaped that a high efficiency is obtained when the fan is running at proper speed. The fans are made with engines direct connected or geared, or may be belt-driven by any convenient source of power. They are made in 9 sizes from 4 to 20 ft. in diameter, with a capacity of rom 75,000 to 500,000 cub. ft. of air delivered per minute. A circular sent out by the Robinson Machine Company, of Monongahela, Pa., which company has an office in the Frick Building, Pittsburg, Pa,, describes the fans briefly.

Simon-Carves, Limited, of Manchester, Eng., pubnsnes a neatly illustrated pamphlet of 30 pages, describing in detail the construction and advantages of the Simon-Carves coke oven system for the manufacture of coke and the recovery of by-products. Ovens built under this system have been installed at a number of English collieries. One of the features of the system is a machine for compressing the coal and charging it into the oven in a solid mass or loaf, the advantages claimed being an improvement in the quality and appearance of the coke; a uniform quality of coke; a gain in the amount of coal charged in each oven, reducing the labor cost per ton of coke, the saving of all labor in filling from top of ovens and in leveling the coal in the ovens, and the ability to coke inferior and ordinary non-coking coals. The device, it is claimed, can be applied to any type of retort oven with or without recovery of by-products. The construction of the Simon-Carves oven is described in detail, and its merits pointed out. Its usual dimensions are 32 ft. 9 in. long, 8 ft. 2 in. high, 20 to 22 in. wide, allowing a charge of about 11½ tons of compressed wet coal in each oven.

"The Excavation of Rock" is the title of a pamphlet of 124 pages, issued by A. & Z. Daw, 11 Queen Victoria Street, London, Eng. It describes the Daw patent rock drills, tripods, quarry bars and other accessories, and the Daw air compressors. The pamphlet discusses the requirements of a good rock drill, particularly as to valve construction. The valve in the Daw drills is not worked by mechanical connections or struck by the piston, nor by a leakage of air, but by the direct pressure of the air, used either at a high pressure or expansively. The valve is described as simple, reliable, durable, almost free from repairs or renewals, setting up no internal resistance, and admitting of a variable length of stroke under the direct control of the operator. The valve is stated to permit of a strong, uncushioned blow and a speed of from 500 to 700 blows per minute under normal conditions. Another merit claimed for the Daw drill is the mounting of the drill cylinder on a patent cradle by which any wear of the guides is automatically taken up. The drill is made in 4 sizes, having 2¼ to 3½-in. cylinders. The pamphlet also contains general directions on the use of drills in tunneling, shaft sinking and quarry work, with notes on the use of explosives and electric fuses, and will interest mining and quarry men generally.

SPECIAL CORRESPONDENCE.

Denver. Feb. 28.

(From Our Special Correspondent.)

One 8-hour bill has passed the Colorado House of Representatives containing the following clauses:

"Section 1. All labor in underground mines, or other underground workings, attending blast furnaces, in smelters, in ore reduction works, in stamp mills, in chlorination and cyanide mills, in leaching works and attending smelting furnaces producing metal and matte, is hereby declared injurious to health, life and limb; and the working period for all persons employed in underground mines, or other underground workings, attending blast furnaces, in smelters, in ore reduction works, in chlorination and cyanide mills, in leaching works and attending smelting furnaces producing metal and matte, shall be 8 hours per day; except in cases of emergency where life or property is in imminent danger.

"Section 2. Every person, body corporate, agent, manager, superintendent, employer, president or director shall, in every case of such emergency, make to the Commissioner of the Bureau of Labor Statistics within 10 days after the commencement of such emergency a report, exhibiting in detail the circumstances creating such emergency.

"Section 3. Any violation of this act shall constitute a misdemeanor, and be punished by a fine of not less than $10, nor exceeding $50."

Extreme advocates of an arbitrary 8-hour law contend that the bill, as it stands, is worthless on several grounds. It is further contended that such a law could have no effect except to make continuous wrangling.

A bill has been introduced into the Colorado Legislature providing for an amendment to the Constitution of the State. The amendment which, according to the bill, is to be submitted to the voters of Colorado at the next election, adds section 16 to article 15 of the State Constitution, as follows: "Any company, association or corporation engaged in this State in smelting, sampling, refining, reducing, milling or otherwise treating ores, minerals or metals, shall be regarded as engaged in a business affected with a public interest and devoted to a public use."

The supporters of this proposed amendment to the Constitution contend that it will absolutely protect the mine operators against excessive treatment charges. The proposed amendment puts the matter in the hands of the State. If the amendment passes the Legislature and is adopted by popular vote, the Legislature will have the power to prescribe what shall be the rate for smelting or otherwise treating each grade of ore.

THOMAS TONG.

San Francisco. Feb. 27.

(From Our Special Correspondent.)

The most important item of news this week is that which assures the re-opening of the famous Maryland-Idaho Mine at Grass Valley. The Idaho-Maryland Development Company, capitalized at $3,000,000, with offices at 101 Milk Street, Boston, Mass., is to follow the famous ore shoot, which yielded so many millions in the Eureka and Idaho mines. The Eureka Mine was discovered in 1851, but did not

pay much before 1857. After 1865 it produced about $4,600,000, of which $2,134,000 were paid in dividends. It was abandoned in 1877, the ore shoot running into the Idaho claim adjoining. This claim was located in 1863. The owners paid in assessments up to 1868 a little over $38,000. At 450 ft. they struck the Eureka shoot. The Coleman Brothers, the principal owners, made fortunes from the mine, which paid more consecutive dividends than any in California ever did, and was worked for many years. In 1894 it was sold to the Maryland Mining Company, of which S. P. Dorsey was the sole owner.

Up to the time the Coleman Brothers sold out, the shoot of the Eureka and Idaho had yielded $16,500,000 gross, most of it from the Idaho. Under the United States Mining law of May 10, 1892, on which the present code is based, the Idaho could not have been legitimately located as a mine, because no pay-ore was found before a depth of 450 ft. The croppings were on the Eureka. The vertical depth of the Idaho workings was 2,200 ft., when the shoot ran into the Maryland ground.

The owner of the Maryland declined to sell; but not having sufficient capital to carry on the work properly, has finally sold his interests to the Boston company, which is to equip the mine with modern machinery and a larger mill than the present one of 40 stamps.

The Norwegian Mine at Tuttletown, Tuolumne County, has also changed hands. It was bought some years ago by the late Harry Emeric, Mr. Murdoch and others, who equipped it and opened several rich pockets, which paid handsomely. Like other mines in that section, this is a pocket ledge, occasionally yielding large returns. The new superintendent is G. A. Whiteford. C. S. Benedict, of San Francisco, is president.

The Legislature has killed the objectionable liability of employers bill.

A smelter is projected on the bay shore, near San Francisco, at Point Richmond, by the Economic Smelting Company. The plant is supposed to cost about $30,000.

The Government is said to be after some of the companies, which have filed placer locations on the desert near Salton, Riverside County, where they are making salt. The charge is that they took a lot of salt from the beds before filing locations, though they have been working some years. The land is 280 ft. below sea level, and a perfect desert.

A gushing oil well has been struck near Sargents, Santa Clara County, 12 miles north of Gilroy. This is practically a new oil field, and is of importance, being in the Santa Clara Valley, near several thriving communities. The well is down only 360 ft., and is expected to yield between 100 and 300 bbls. daily.

San Luis Potosi, Mex. Feb. 24.

(From Our Special Correspondent.)

Torreon, the intersection of the Mexican Central and International railroads, is at present the western terminus of the Coahuila & Pacific, and is fast becoming one of the industrial centers of the Republic. These railroads are feeders to the Torreon Smelter (though the ores from Viesca, close by on the Coahuila & Pacific, can be smelted now at the plant there), and enable it to compete with the Monterey smelters, by intercepting ores from Durango and the many districts tributary thereto, among which have been invested in the last 3 months, according to E. J. Jewitt, mining engineer, of El Paso, Texas, over $600,000 of American money.

An hour and a half's ride below Torreon, at Jimulco, are located the properties of the Jimulco Mining Company. Six hours beyond, the station of Gutierrez, shipping point for the Sombrerete Mining Company, is reached. From here a branch of the Central is to run westward to Durango. It is hoped that the visit of the Central's directors, who are now in the Republic from St. Louis, Mo., will hurry the matter along. This branch will pass through Sombrerete, where are located the mines and lixiviation plant (the largest in Mexico) of another of the branches of the Campania Metalurgica Mexicana, known as the Sombrerete Mining and Milling Company, whose production for January was over $200,000 Mexican; thence the road will pass near Chalchihuites, where work started by the Franciscan monks still continues, with good returns, and one mine, the Dolores, owned by the brothers Luis and Jesus Muguiro, has just been bonded to an American company for $200,000 gold; by Vacas, whose mines, mill and smelter are capable of excellent returns were they not hampered by litigation; and will reach Nombre de Dios, interesting for the tin deposits in the neighborhood, and on to Durango, to compete with the International.

From Gutierrez it is but a short run to Fresnillo, where there are still some good properties, and 2½ hours to Zacatecas, where are many old mines, of which the San Rafael, now owned by the Stillwell Syndicate, is credited with $75,000,000. From Zacatecas another line runs down to the thriving camp of Ojo Caliente, and but 3 hours' south on the Mexican Central, is Aguas Calientes, the location of the largest plant of the American Smelting and Refining Company in the Republic. Here the Tampico branch of the Central connects with the main line. The plant of the American Smelting and Refining Company at this point is a model, with lead furnaces, copper matte furnaces and copper converters. It receives ores from all over the Republic, but cannot handle all that it could obtain, so that other smelters are a necessity.

The question of freight cars is of serious moment to the miner and to the country at present, but a concession has been granted to Isaac M. Hutchinson, of Mexico City, for the establishment of large car works. The company will be organized in March with $1,000,000, gold, capital, and will immediately start work on buildings. The company intends to build 20 cars a day, as it is estimated that the 65 independent lines of the country can easily make use of 7,000 cars a year. All kinds of railroad, hand and street cars will be made.

Word comes from Sonora that the Yaqui Smelting and Refining Company, of Toledo, O., with headquarters at Hermosillo, Sonora, will immediately begin the erection of a smelter at San Antonio de la Huerta, a promising new district on the Yaqui River. In the northern part of Sonora the Anglo-American Copper and Gold Company is working. Southwest of Cananea and on the same formation, are the Santo Domingo mines, where 4 tunnels have shown large bodies of ore running $16 in gold and 6 per cent copper.

In Chihuahua, along the Concha River, at the foot of the San Carlos and Mulato mountains, systematic prospecting has shown beds of anthracite coal, as well as asphalt and petroluem. At Terrazas, Chihuahua, the Boston & Chihuahua Mining Company is opening large bodies of good ore, and the work is attracting much attention. The greater part of the ore is going to the Mapimi Smelter.

The Monterey Iron and Steel Company is at the head of an organization formed in Monterey, with a capital of $1,000,000 Mexican, known as the Monterey Coal Company, to work the new coal fields at El Menor, about 12 miles from Baroteran, a station on the International Railroad, 90 miles south from Eagle Pass, Tex.

The stock market during the week has been dull. The only stocks that seemed really in demand were Cinco Senores at $258, Santa Maria de la Paz at $810@$820, Candalaria de Pinos at $340, and Providencia San Juan de la Luz, of San Felipe, Guanajuato, at $285, with dividend No. 34 of $2, payable February 27.

London. Feb. 21.

(From Our Special Correspondent.)

The South African mining market has been confined this week to speculation in shares of companies operating in the eastern portion of the Rand, owing to the announcement that the bore-hole at the Cinderella Deep has intersected the main reef at a depth of 3,309 ft. The core shows that the lower 4 ft. of the reef assays 10 to 12 dwts., but the whole thickness of the reef is over 16 ft., all containing more or less gold, the payability of which cannot be determined off-hand. This discovery is considered to be very important, and has led to some speculation among rich Jews in the inner circles. The general public, however, do not go into the market at all.

The West Australian market has once more been largely occupied by the Great Fingall episode. Mr. Moreing has now returned from China, and has been devoting all his time to the investigation of the defalcations of his late partner, A. S. Rowe. He recognizes that he must personally help to put the company on a satisfactory footing once more, and has accepted a place on the board of directors. He has definitely offered to make good the whole of the losses of the company, and of private individuals brought about by the wrongdoings of Rowe. The actual amount for which he has made himself responsible is nearly £150,000. This is a handsome action, but it is to be hoped that it does not mean the abandonment of the search for the missing man and forcing him to disgorge. There have been far too many frauds left unpunished recently. It is not a good thing for the public for rogues to think they can swindle their partners and the public with impunity. When the announcement of Mr. Moreing's accession to the board was made the shares of Great Fingall recovered somewhat, but immediately afterwards the scheme for the issue of new shares was published and the market fell to pieces. The new scheme provides for the issue of 25,000 new shares at £6 each, which will thus raise £150,000 new working capital. The nominal price of the shares is 10s., and the present quotation is about £8. The new shares will be offered to shareholders at the rate of 1 share to every 10 already held, so there is very little in the way of bonus to be obtained by the shareholder if he accepts his quota. The money is to be devoted partly to provide 20 more stamps and cyanide plant, and partly to extinguish debts contracted. It appears that in the past gold in transit from the mine to England was included in the divisible profits, so that money had to be borrowed on this gold in order to pay dividends. With more cash in hand provided by this issue, the necessity for this somewhat improvident way of paying dividends is obviated.

A good deal of interest has been evoked by the issue of an informal report on the prospects of the El Oro Mine. Mr. R. T. Bayliss has just returned from Mexico, where with Messrs. Foster and Raymond he made a thorough examination of the mine. The way the mine has opened up has exceeded the most sanguine expectations, and there are now over 1,000,000 tons of ore in sight, with no indication of any likelihood of a falling away in the values as development goes on. It has therefore been decided to erect 100 additional stamps, making the total 200. The economies introduced by working on a larger scale will permit of the treatment of bodies of ore which are not now being exploited on account of their comparatively low grade, so that with the larger plant it is allowable to reckon on the whole of the million tons in sight mentioned above as payable ore. It is not intended to issue any new shares to provide for the capital required, but to utilize surplus profits. Mr. Bayliss has often proved his ability as a mine administrator and director; the present proposition is another example of it.

A company has recently been formed under the name of the United Arizona Copper Company, Limited (not a very happy name, owing to its similarity to that already well known), to take over the properties of the Reward Consolidated Mining Company, a Boston company owning the Reward group of copper mines in Pinal County, Arizona. The properties were developed to a certain extent by the Boston owners, and a small smelter was erected. Work, however, was abandoned six or more years ago, and it is only six months ago since some London people took an option on it. The purchase has been completed, and some development work has been done by Mr. Guthridge. Before money is spent on a large scale, more prospecting work is to be done and the nature of the ores examined. The chief shareholder here is Mr. P. Macfadyen, who is well known as a producer of manganese ores in India, which are sold to the Carnegie people.

An event in connection with the Central Chile Copper Company that has recently occurred, deserves a fuller and truer explanation than has appeared in the London mining and financial papers. I refer to the removal of Mr. J. H. Collins and Mr. C. H. Thompson from the directorate by a vote at a meeting of shareholders held the other day. The removal of a director in this way is always a serious matter, and it is only justice to a mining engineer of repute like Mr. Collins that the real facts of the case should be stated. It will be remembered that the Central Chile Copper Company is a reconstruction of the old Panulcillo Company, which was originally formed in 1864. In 1893 the Panulcillo property ceased to be remunerative, so the company was reconstructed as the Central Chile Copper Company and the Condesa property was purchased. Since that time other neighboring properties have also been acquired. At the time of reconstruction in 1894 Mr. J. H. Collins was asked to join the board as a director, so that the company should have the benefit of his experience in the treatment of low-grade copper ores. At the same time Mr. Eugene Goldschmid joined the board as representative of certain French shareholders who joined in the reconstruction. During the last two or three years there have been several serious differences of opinion between Mr. Goldschmid and Mr. Collins as to the method of managing the properties. Mr. Goldschmid is not a man of technical training or knowledge, and it is only natural that Mr. Collins should find reason to object to many of his propositions. The last disagreement was due to Mr. Goldschmid's proposition that the matte should be converted into bars by a certain patent process, in which he is personally interested. Mr. Collins was of opinion that this patent was not valid, and that any point of novelty claimed for it was of no practical value. The use of the patent, however, would bring Mr. Goldschmid a considerable royalty, so it may be imagined that he was not ready to abandon his proposition. While Mr. Collins was in America, whither he was called by the murder of his son Arthur Collins, Mr. Goldschmid took the opportunity of stirring up an agitation against him and his fellow director, and called the special meeting to remove them shortly after Mr. Collins' return. Mr. Collins and his party were not provided with proxies, owing to the lack of foresight on the part of their legal adviser, so Mr. Goldschmid won the day. The whole affair was not by any means creditable to the aggressive party, though, of course, everything was strictly in order. That the aggressive party were not altogether proud of their methods of attack may be judged from the fact that the reports of the meeting in the financial and mining papers were perfunctory and confused or covered the real issue. As I said before, the removal of a director in this way is usually associated with some dereliction of duty, so it is only just and fair to Mr. Collins that the real facts of the case should be given.

EDWARD WALKER.

Sydney, N. S. W. Jan. 20.

(From Our Special Correspondent.)

Northern Territory.—On the Arltunga gold field surface stone dollies well and some good reefs are being opened. The present population is about 200, and is increasing rapidly, but men have been officially warned not to proceed there unless they have at least 3 months' provisions.

Queensland.—The lode lately cut at the 750-ft. level, at Mount Morgan, has been penetrated for 60 ft. Assays taken at regular intervals average up to date $23 gold per ton.

New South Wales.—The number of men employed at Broken Hill at the end of 1902 was 5,014, as against 4,860 at the end of 1901. The new sintering works of the Proprietary Mine employ about 250 men. At works connected with the Broken Hill mines there are 1,600 men employed at Port Pirie and Iron Knob, 100 at the Bellambi coke works, and about 400 at Cockle Creek. During the last 4 weeks heaps containing 13,000 tons lump slimes were fired at the sintering works, and fresh heaps continue to be built up at the rate of 2,500 tons a week. The magnetic separation plant erected by the Sulphide Corporation is treating about 300 tons of middlings per month. As the results are so satisfactory the directors are considering a scheme for the immediate erection of a plant to increase the output of zinc concentrates. It will embrace the utilization of 700,000 tons of zinciferous by-products now lying on the dumps, containing approximately 4,822,000 oz. silver, 38,600 tons of lead and 165,300 tons of zinc.

The Newcastle coal trade during 1902 shows the total exports of coal to have been 2,996,764 tons, which is about 4 per cent less than that of 1901; the difference would probably have been still greater had the "standard price" of 11s. been maintained.

The Tucker's Hill gold-field near Hargraves is attracting attention. The gold is found in saddle reefs, of which three have been discovered. Besides the coarse gold the quartz carries some galena and occasional copper stains. The reefs, which are up to 2 ft. wide, crush well, giving bulk returns of 4, 5 and 8 oz. to the ton.

Tasmania.—Mount Lyell Company is effecting further economies by extending the electrical power plant to the reduction works.

The offer for the purchase of the Tasmania Gold Mine by an English Syndicate having fallen through, a further offer has been made, the Englishmen proposing that the present capital of £300,000 in 60,000 shares of £5 each be increased to £400,000 of 400,000 shares of £1 each, and that they be given 100,000 for finding £100,000 working capital, the condition being that though the company remains in Tasmania, a London share register be opened.

Everything appears to be going on well at the Briseis tin mine. Large bodies of overburden are being removed, and tin is being raised in sufficient quantities to more than pay the expense of working the mine.

There has been a much improved share market since the beginning of the year, partly due to the higher figures current for metals, and partly to the better prospects of some of the mines.

GENERAL MINING NEWS.

ARIZONA.

MOHAVE COUNTY.

(From Our Special Correspondent.)

Burro.—This mine, on the Rio Sandy, has 10 men at work. A wagon road is being built from the mine to the railroad at Hackberry. J. P. Wallace, superintendent, intends to erect a small milling plant this summer.

Grunfield.—Men have lately gone to work on this mine at Cerbat.

Grass Springs Gold Mining and Milling Company.—This company, at Gold Basin, has paid off all indebtedness, and resumed work.

Homestake.—A. J. Pickerell, who has a bond on this mine, 4 miles west of Kingman, has made the second payment.

Mohave Gold Mining Company.—This company, at Millers, is receiving 16 cars of lumber for the new stamp mill.

Mother Lode.—The new steam hoist on this mine at Chloride is in operation, and the 2-compartment shaft is going down rapidly.

Minnesota.—Owing to an insufficient supply of water for this mine and the 225-ton mill at Chloride, the Philadelphia & Arizona Mining Company has laid off half its working force.

Oro Plata.—The new mill at this mine, at Todd Basin, is almost ready.

Queen Bee.—The new steam hoist for this mine at Mineral Park is being put up at the 200-ft. shaft.

Railroad.—This claim, at Acme, has been sold by Len Lentzinger, H. W. Kemper and John F. Withers to the Gold Road Company. The claim is the south extension of the Gold Road.

Redemption.—R. J. Ferguson, owner of this mine at Chloride, has a car-load of ore to send to Denver. The upper tunnel is in over 200 ft., and the vein is 17 ins. wide.

Rough Rider.—The attachments issued against this mine at Layne Springs lately, are to be lifted and work resumed by James Haas and others.

Ruby Group.—W. H. Chapman has sold a half interest in this group of claims at Signal to J. A. Marshall, of Hackberry. The group is 2 miles from the Rio Sandy.

San Francisco.—At the 300-ft. level of this mine at Gold Roads, good gold ore is reported struck. At a meeting of the directors in Los Angeles, Cal., it was decided to push development.

YAVAPAI COUNTY.

(From Our Special Correspondent.)

Henrietta.—This mine, from its mill a few miles south of Prescott, belonging to the Bragranza Company, recently turned out a gold brick weighing 35 lbs.

Poland.—This mine, in Big Bug District, has a 20-stamp mill in operation. A tunnel is being driven 8 ft. wide, 12 ft. high, and is to be 8,080 ft. long.

United Verde Copper Company.—The smelting plant at Jerome is running, and 600 men are at work. When both mines and smelting furnaces are in full blast 900 men will be employed.

CALIFORNIA.

AMADOR COUNTY.

(From Our Special Correspondent.)

Oneida.—Mill and underground operations at this mine, near Jackson, were recently suspended some days because the electric power gave out.

Zeila.—The repairs to the shaft of this mine at Jackson are nearly completed. The work has been under way some months.

CALAVERAS COUNTY.

(From Our Special Correspondent.)

Duchess Mining Company.—This company at Vallecito, W. E. Emery, secretary, has completed a wire rope tramway to convey ore from the tunnel to the 10-stamp mill. The company is developing a group of quartz mines.

Golden.—This quartz mine at Vallecito is in charge of a keeper awaiting the result of litigation. It is thought work will be resumed this spring.

Horeshoe.—This group near Murphys, is shortly to be inspected with a view to purchase. The mines are owned by Cunliffe & Driver, who have bonded them.

Mountain King Gold Mining Company.—This company, which recently bought the Heinsdorff group of mines at Murphys, is taking down the old Heinsdorff Mill to rebuild it. The Rose Rock is the principal claim.

HUMBOLDT COUNTY.

(From Our Special Correspondent.)

Orleans Bar Mining Company.—This company, at Orleans, has closed its mines some weeks. The heavy rainfall followed by snow has done much damage and necessitated a good deal of work in repairing flumes, digging away slides, etc.

KERN COUNTY.

(From Our Special Correspondent.)

Big Blue Mining Company.—This company, at Havilah, finds steam much more expensive than water power, and is to use water power again.

Breadwinner Mining Company.—This company, of Los Angeles, owning the Cowboy Mine, near Caliente, is arranging for a 40-stamp mill.

MARIPOSA COUNTY.

(From Our Special Correspondent.)

Long Mary.—This mine, 7 miles from Mount Bullion, is having a crushing of 500 tons of ore at the Mariposa Commercial and Mining Company's mill. The main shaft is down 400 ft. and 2 levels have been run. The vein is narrow, but runs from $25 to $30 per ton. The mine is under lease to A. C. Cathey, Claude Wills and J. and D. Lord, and 10 men are employed.

NEVADA COUNTY.

(From Our Special Correspondent.)

Idaho-Maryland Development Company.—This company has been organized to work the Idaho and Maryland mines at Grass Valley. The officers are Thos. W. Shapleigh, E. M. Preston, George E. Marvin, Henry P. Colson and John Carter. C. B. Lakenan, of Grass Valley, is in charge of the engineering department. The company is to put up a 250-ton mill, and will build a cyanide plant.

Wyoming.—Retimbering the drainage tunnel of this mine at Nevada City will take about 4 months. The mine belongs to the Champion Mining Company, of which E. R. Abadie is general manager and superintendent.

PLACER COUNTY.

(From Our Special Correspondent.)

California.—This mine at Shady Run, T. H. Wilkins president, has a 10-stamp mill on the ground.

PLUMAS COUNTY.

(From Our Special Correspondent.)

Colonial Mining Company.—This company, of Mill Creek, near Quincy, owns several quartz and gravel properties. A new ditch has been completed and lumber is on the ground for a shaft house. A tunnel is being run on the Homestake quartz mine, and another on the Mountain Chief. H. L. Archer is general manager.

SAN BERNARDINO COUNTY.

(From Our Special Correspondent.)

Giant Ledge Gold and Copper Company.—Los Angeles capital is largely interested in this company, in New York District, near Manvel. The veins are wide and some thousand feet of development has been done. H. R. S. Gregory is secretary.

SAN DIEGO COUNTY.

(From Our Special Correspondent.)

Free Coinage.—Marr & Middaugh, of Colorado Springs, Colo., are said to have bought these mines at Descanso from Eugene Hawkes. A company is to be organized.

Oro Copia Mining Company.—This company is soon to develop mining claims about 16 miles from Salton. The company owns some 11 claims, and has spent about $18,000 in exploration. Hoist and reduction works are about to be put up. Water is to be piped to the mines, and an electrical plant at Salton will furnish power. W. E. Winnie, Bullard Block, Los Angeles, is secretary. A number of old Comstock (Nev.) men are interested.

SHASTA COUNTY.

(From Our Special Correspondent.)

About the mines in the higher mountain counties the snows are very deep and large numbers of mines are idle, having come down to the valleys to wait until spring.

Great Western Mining Company.—This company intends putting up a smelter for the Afterthought Copper Mine in Furnaceville District, 5 miles from Redding. The machinery is said to be on the way to Copley.

TRINITY COUNTY.

(From Our Special Correspondent.)

California and Nevada.—Hugh Hume, of San Francisco, has a bond on these quartz mines, owned by J. H. Boyce, and intends to put up a 20-stamp mill and a cyanide plant.

Enterprise and Lone Jack.—These mines at Coleridge, owned by Eugene Day, and under bond to J. F. Stevens and J. W. Hayes, of Spokane, Wash., are looking well. A tunnel is being run to tap the main ledge of the Enterprise, and that on the Lone Jack has cut the ledge which at that point runs $20 per ton. There are 14 men employed under Mark Manley, manager.

Senger.—This group of gravel mines, near Weaverville, owned by Jacob, Milan and Peter Senger and Mrs. Kate Hughes, have been bonded to Berkeley men. The gravel banks average about 150 ft. deep, and there are 420 acres. There is good dump and water can readily be brought in.

Three Peaks.—At this mine, near Abrams, 16 men are at work. The mill will be erected in the spring.

TUOLUMNE COUNTY.

(From Our Special Correspondent.)

Doyle Ranch.—This mine, near Columbia, will shortly resume work.

Draper.—At this mine, the big Cornish pump is being put in.

Mackey-Ryan.—This copper mine, near Stent, which has not been worked for nearly 30 years, is to be reopened by the Pyne Smelting Company, which has a bond on the property. The mine is to be unwatered and a 3-compartment shaft sunk.

Providence.—This mine has resumed work after having repaired the hoist.

Sierra.—At this mine, near Chinese Camp, the 2-compartment shaft is now down 110 ft. A tunnel taps the vein at 70 ft., and drifting has developed good ore.

Soulsby.—At this mine, near Soulsbyville, William Sharwood, superintendent, the mill is running one shift, 10 stamps.

COLORADO.

CHAFFEE COUNTY.

Mascot Tunnel.—This tunnel, near Turret, is in over 250 ft. E. E. Briggs is superintendent.

Vesper.—E. E. Briggs is said to have bought the controlling interest in this group in Turret District, between the Mascot property and the town of Turret.

Vivandiere.—A good streak of ore is reported in the 600-ft. level. The vein will be explored, and the shaft sunk to the 700 ft.

CLEAR CREEK COUNTY.

(From Our Special Correspondent.)

Miners' Strike.—The strike in the Idaho Springs District has somewhat cleared, and many of the mines have compromised with the union on a minimum of $2.75 per day of 8 hours. The Sun & Moon refuses to grant the demand, and the 160 men on that property will probably stay out unless the union gives in. The Newhouse tunnel is idle. The Gem, the other mine working through it, dislikes paying $1,950 per month for power and operating expenses. The union demand was as follows: Not more than 8 hours to constitute a day's work; no person to do any contract work in and around the mines for a longer period than 10 days without being paid equal to the scale per day; and the minimum for all classes to be: Machine men on shaft and double-track tunnel, $3.50 per day; helpers to same, $3.25; machine men, ordinary work, drifting, stoping, etc., $3.25; helpers to same, $3; single hand steel men, drifting, stoping, etc., $2.75; same in shaft work, $3.25; double hand, $3; same in shaft, $3.25; blacksmiths, $3.25; helpers to same, $2.75; timber men, $3.25; helpers for same, $2.75; trammers, $2.75; muckers, $2.75; engineers, $3; all top men not less than $2.75. Aside from the $2.75 minimum the balance of the scale was being paid with few exceptions.

Burns-Moore Tunnel.—Operations have been idle for 2 months, because of the creek being frozen, but Manager J. M. Shaller, whose office is in the Mack Block, Denver, says that contracts are to be let at once to drive the cross-cut to a number of the more noted mines at the head of Cascade and Ute creeks. Power drills will be used.

Comstock Leasing Company.—C. J. Hughes, Jr., of Denver, has installed a gasoline hoist in the 4th level of the Comstock, and will sink the winze on 15 in. of $100 ore. The mine carries mill ore.

Little Mattie Mining and Milling Company.—It is stated by W. S. Leebrick, manager, of Idaho Springs, that in the 4th level east the shoot now shows 7 ft. of smelting ore, of which 4 ft. is averaging $117 net to the ton. The 3d level east is also coming into the same shoot which was 300 ft. long in the adit level. In the Newton Mine leasers have opened 12 ins. of $60 ore. Machine drills are in use in every part of the mine.

EL PASO COUNTY.

Millmen's Strike.—The Mill and Smelter Men's Union has voted to extend the strike at the Standard Mill in Colorado City to the Telluride and Portland mills. The Portland Mine may have to close. The Telluride and Portland managers refused to advance wages. The Standard Mill, where the strike began, is still running with non-union men, who lodge in the mill buildings.

(From Our Special Correspondent.)

Millmen's Strike.—A telegraphic dispatch from our special correspondent states that at the request of the sheriff of El Paso County and under legal advice of the State attorney-general, Governor Peabody has ordered 350 militia to Colorado City. This action is taken to prevent further disturbance in connection with the strike of the millmen at the local plants. Governor Peabody says the strikers must be made to understand that they cannot destroy property and endanger the lives of other men.

GILPIN COUNTY.

(From Our Special Correspondent.)

Clear Creek Mining and Reduction Company.—The repairs and improvements are completed at the Golden Smelter, and the plant has started again. During its shut-down of 3 weeks the shipments of ores from Gilpin County fell off considerably.

Electric Spark Gold Mining Company.—This company has its Grace Darling shaft in Lake District down 210 ft. Levels have been started at 200 ft., and in the east side have opened a good crevice, showing a streak 12 in., which assays well in gold and silver as well as from 15 to 33 per cent in lead. Omaha, Neb., parties, who are interested and intend sinking considerably deeper. J. C. Martin, Black Hawk, is manager.

Hall.—A crevice 6 ft. wide has been opened in the Hall shaft in Russell District, of which 2½ ft. is smelting ore, carrying values of over $100 per ton, while the rest will make a good free milling proposition, running from 2 to 4 oz. gold per cord. The shaft is only down 140 ft. Isaac Hall, Russell Gulch, is the owner.

Mackey.—It is reported that D. H. Moffat and associates, of Denver, are interested in this large group of patented lode and placer claims in Mammoth Gulch section, about 15 miles west of Central City. The property has been partly developed by several tunnels, but has been idle several years. The new Moffat road to Salt Lake will bring the property within 5 miles of transportation. It has been handicapped by distance from shipping points. The property is owned by R. Mackey, Fulford, Colo.

Payne.—Local men have a lease and bond on the Payne shaft of the West Flack property on Quartz Hill, and are making repairs. The shaft is 430 ft. deep. J. H. Nankervis, Nevadaville, Colo., is in charge.

Rome-Gardner Mining Company.—The Clark-Gardner Mine in Nevada District has the shaft down 1,000 ft. Indications have improved, and sinking will continue. Shipments are regularly made to the stamp mills, as well as to the concentrator, the ores, however, being low grade. J. W. Bostwick is manager for New York men.

Waltham.—Messrs. Carlson, Tanner and Anderson, of Idaho Springs, bought the interests in the lease of R. H. Hastie, Jr., and are said to have refused an offer of $60,000. They have given a contract to Idaho Springs parties to erect a large shaft building, and will install an 8 by 8 hoisting engine and 50-h.p. boiler. The shaft is down 150 ft., will be sunk 100 ft. on contract. The property has produced nearly 40,000, with only surface workings, during the past 8 months. M. W. Tanner, Idaho Springs, is manager.

Stratton's Cripple Creek Mining and Development Company.—At a recent meeting of the directors it was decided to postpone letting leases for a few weeks, as the maps were not ready. It was also decided that new applications would have to be made by block numbers for ground applied for before the maps were made. The secretary was instructed to list all applications for lease and submit them to the directors at the meeting on March 28. Plats of the property are on file at the company's offices in Cripple Creek and Colorado Springs. No dumps will be leased at present.

Stratton's Independence, Limited.—It is understood that opening the 1,400-ft. level is to begin at once. A few repairs have been made on the pump and the water is easily handled. The mine is producing from 250 to 300 tons per day, coming from every level. About 450 men are employed.

LAKE COUNTY—LEADVILLE.

(From Our Special Correspondent.)

Leadville Ore Shipments.—The output for February was a little over 60,000 tons of all classes of ore. Several new strikes, notably on the gold belt, were the features of the month's work. The starting of the new Resurrection concentrating mill opens up March very favorably. The action of the Legislature over the 8-hour law is causing much uneasiness.

Big Evans Mining Company.—The machinery ordered some time ago for No. 2 shaft has not arrived.

Coronado.—The retimbering of the old shaft is nearly completed, and the machinery has all been overhauled. In a short time shipments will start.

Dolly B.—After coming here to open up this property and resume shipments, A. J. Andrews, one of the owners, has closed the mine and returned to Montreal. This was due to trouble with P. J. Connolly, one of the other owners of the property, and it is announced that the mine will remain closed until Connolly is willing to step out.

Gold Basin.—This company is working on the old Big Four territory through a new shaft. It followed a vein showing big gold values, but has been unable to locate the main vein and is now prospecting.

Little Bob.—After several years of work on this gold belt property adjoining the Louise and Fanny Rawlings, George F. Campion, the owner, has made a good strike in a drift in 300 ft. from a shaft 200 ft. deep. After passing through 30 ft. of mineralized contact matter he has opened 10 ft. of ore that will average over 1 oz. gold; 8 to 17 oz. silver and 8 to 35 per cent lead. The vein is strong, and arrangements are being made to ship. A large body of low-grade cyaniding material has been encountered.

Diamond Gold Mines Company.—The recent strike is undoubtedly the extension of the Resurrection ore shoot. The ore has been followed over 100 ft. continuously at the 1,020-ft. level, and is all fair grade oxidized material. The cross-cuts and 2 15-ft. upraises show solid ore. The first 100-ton lot has just been shipped. A new hoist has been ordered which will enable heavy shipments and permit sinking 500 ft. deeper.

Ollie Reed.—This company has drifted on a small streak of ore that has widened to 12 ft., and is supposed to be an extension of the New Monarch ore shoot. The new strike is a good shipping material.

Printer Boy Gold Mining Company.—After months of litigation, during which the property has been idle, an effort is to be made to resume on the Printer Boy claim. New York parties are back of the combination, and Manager W. B. Price is now in New York in consultation with the owners.

Progressive Mining and Development Company.—This company on Fryer Hill, which recently encountered carbonates at 280 ft., has sunk 75 ft. deeper, and is now upraising. Ore is also being hoisted for the first time from the new strike, which has been followed 100 ft. one way and 50 ft. another. The streak is 1 to 3 ft. wide, averages $50 to the ton. There is also an iron ore body above being developed that averages 16 oz. silver and 55 per cent iron excess. The new shaft on the Olanthe placer has reached 110 ft., at which point a diamond drill is being installed.

Reno Group.—In sinking the new shaft on the Reno claim a great deal of low-grade ore, which will not pay to ship, has been cut. The shaft is 630 ft. deep, and still going down.

Resurrection Mining Company Mill.—The new concentrating mill, one of the most complete in the camp has sucessfully started, and will handle 150 tons a day. It introduces several new features for the first time here, notably the Wetherill Magnetic separation process, and makes a nice concentrate. There are 3 Wetherill machines, which separate the zinc, making a product averaging 48 to 50 per cent zinc. The material then passes over 12 Wilfley tables, producing a high-grade lead-iron. Shipments will soon be resumed from the immense low-grade ore bodies already blocked out.

Seeley.—A very fair grade iron has been opened up by lessees, who are making regular shipments.

Tamerack Combination.—The Tamerack and Humboldt properties are being worked near Riverside by the Occidental Development Company under the direction of C. J. Baird. Main work is a tunnel in Tamerack, now in 800 ft., producing some ore running 8 to 10 per cent copper that is being thrown over the dump. The 15 per cent material is being binned. The main shaft is down 150 ft., and will be sunk another 100 ft. before October 1.

Valley Mining and Leasing Company.—Although a good strike was recently made the property has been closed and no reasons given. A meeting of the stockholders is to be held at once in Springfield, Mass.

MINERAL COUNTY.

Captive Inca.—This claim, near Creede, is being developed under the management of W. G. Boyle. John R. Hanna, of Monmouth, Ill., is president. A contract has been let to sink a shaft 5 by 15 ft. to a depth of 500 ft.

Commodore.—This Creede mine has contracted to ship 1,000 tons of grade ore for fluxing as a test.

Corsair.—This mine, in Sunnyside District, is shipping ore. A new strike, 3 ft. wide, is reported.

Humphrey.—This mill, which has been shut down from lack of water, will resume as soon as the snow begins to thaw. It has a capacity of 350 tons daily. Steam power is to be installed by next winter.

OURAY COUNTY.

Camp Bird, Limited.—The report of January shows 6,253 tons of ore crushed. Bullion sales amounted to $124,750 and sales of concentrates (520 tons) to $31,137. The cyanide mill treated 3.665 tons, yielding an estimated value of $9,732, the total return for the month being thus $165,619. The working expenses were $61,824, leaving an estimated profit of $103,795, not counting expenses in London.

PITKIN COUNTY.

Mollie Gibson.—At the recent annual meeting at Council Bluffs, Ia., J. J. Hagerman, Percy Hagerman, R. J. Bolles, William O'Brien and Cortland E. Palmer were elected directors. In his report for 1902 the president stated that all work on company account has ceased, that the property is under lease to the Smuggler Company, and that there is but little prospect of operations ever being profitably carried forward on company account. The ground above the 13th level has been thoroughly prospected, and no very large ore bodies can be looked for in that territory, while to prospect deeper would require a large sum of money, which, with the low price of silver and the heavy expense does not seem justifiable. The company owns a three-sevenths interest in the Mollie Gibson-Argentum Juanita Mill, which has been leased by the Percy La Salle Mining Company, of Aspen.

SAN JUAN COUNTY.

Gold King Consolidated.—Contracts are reported pending for a 100-stamp mill for this company of Silverton. The company already has an 80-stamp mill in operation, and expect to have the mill in operation by November 1. The plans for the mill have been drawn by the Denver Engineering Works Company. The tailings will be run over vanners. The company owns about 200 acres of land about 7 miles from Silverton, and is employing about 200 miners. W. Z. Kinney is superintendent.

TELLER COUNTY—CRIPPLE CREEK.

(From Our Special Correspondent.)

Blue Bell Mining, Milling and Power Company.—At the deferred annual meeting in Cheyenne, Wyo.,

the following directors were elected: Charles Walden Duncan Chisholm, H. C. Shimp, John McConaghy and C. F. Rickey. Mr. Rickey was afterward elected president, Mr. Walden vice-president, Mr. Shimp secretary and Mr. Chisholm treasurer.

Elkton Consolidated Gold Mining Company.—A circular to the stockholders shows the company's affairs of the company to be in fairly good shape. The circular states that when the present management took hold about July 15, 1902, the pumps were handling about 2,700 gals. of water per minute, whereas they were only built to handle 2,000 per minute. The mine was run at a loss of $74,980 from January 1, 1902, to July 1, 1902, and at the latter time there was but little ore in sight, a number of unpaid bills and only about $3,000 in the treasury. The new management imediately cut operating expenses to about one-fifth, and got greater efficiency in all departments. After a careful study it was decided that about $400,000 would be needed to unwater the 8th and 9th levels, and this work was abandoned. Within the last few months a large amount of work has been done, and since September the mine has paid expenses. At present the company is about $20,000 in debt. A number of new ore bodies have been opened up and much new ground prospected. E. M. De La Vergne is manager, and Mr. Sherwood is chairman of the executive committee.

Empire State Mines Company.—Numerous rumors are heard of litigation between this company and the Isabella, that the company is to sue the Isabella and others, that the Islabella is to sue the Empire or the Orphan Belle, the company that owned the Empire property at the time the ore was alleged to have been taken. As to the truth of these rumors no satisfactory information can be had.

Golden Cycle Mining Company.—It is reported that a change in the control may soon occur. It is understood that W. H. Reynolds, of Brooklyn, N. Y., is soon to have an option on the control of the stock. At present the stock is controlled principally by J. T. Milliken, of St. Louis, Mo., several other Eastern men and G. E. Ross-Lewin, of Denver, and L. E. Hill, of Colorado Springs. The probable price per share is unknown, but is understood to be somewhere around 90c. per share.

IDAHO.

IDAHO COUNTY.

Cove Placer Mining Company.—This company expects to start work about April 1 on the Clearwater River, near Grangeville. Three thousand feet of new steel pipe, from 11 to 40 in. in diameter, will be laid. The pipe has been made at the camp during the winter. The ground is an old channel of the Clearwater, considerably above the present level of the river. H. E. Heppner, the manager, will employ about 12 men during the season.

Elk Gold Mining and Milling Company.—This company, recently organized in Wardner, and composed of Wallace and Wardner men, has commenced work on the property on Red Horse Creek, near the headwaters of Siegel Creek| The company intends to do a large amount of development. F. L. Johnson is president.

Homestake & Idaho.—It is reported that H. L. Hollister, acting for a syndicate composed of Chicago men, has completed a deal for the Homestake & Idaho group of claims, 17 in number, for $125,000. The properties are located on Beaver Creek, in the Thunder Mountain District.

Roby.—These placers, a few miles above the Cove Company's operations, have been sold to Col. Hudleston, one of the former owners of the placers owned by the Cove Company. The new owner is laying out a ditch.

SHOSHONE COUNTY.

Because the mills cannot handle the ore, owing to the scarcity of water and other reasons, 30 men have been released at the Standard Mine, and about as many from No. 6 tunnel of the Mammoth. The other mills up Canyon Creek are running full blast.

ILLINOIS.

(From Our Special Correspondent.)

Annual Convention of Illinois Coal Operators and Miners.—The Illinois Coal Operators' Association met at Springfield, Ill., on February 23, and elected a committee composed of Messrs. Bent, Traer, Kutz, Lukens and Peabody, to formulate an agreement to present to the miners, and then adjourned to meet the miners to form an agreement for the year beginning April 1. This joint convention elected W. D. Ryan State secretary of the United Mine Workers of America, chairman, and C. L. Scroggs, secretary of the Illinois Coal Operators' Association, secretary. The convention left the whole matter of making an agreement to a scale committee composed of 3 miners from each district, and the executive committee of the Illinois Coal Operators' Association, which is composed of 3 operators from each district, the committee to include the State officers of each organization.

At the first meeting of the joint scale committee the operators at once signified their intention of allowing, without any question, the flat advance of 6c. per ton as granted at the interstate convention at Indianapolis, but the miners demanded an additional advance of 5c. per ton for all coal 5 ft. or less in thickness in all districts in the State, where it had not heretofore been granted. This the operators flatly refused to grant, and after arguing for two days the miners gave up. In Williamson County and the Northern fields the miners demanded a further advance of 4c. per ton, which they claim for various reasons they have been entitled to for several years. This question was referred to a sub-scale committee, composed of one miner and one operator from each district, together with the State officers of each organization. This committee has been holding two sessions daily since its appointment, but so far has agreed to nothing. When it reaches an agreement it will report to the joint scale committee that will in return report to the joint convention. After all this is done, each district in the State will hold a joint convention to settle local matters not included in the State agreement. All the meetings were attended by National President Mitchell, of the United Mine Workers.

INDIANA.

(From Our Special Correspondent.)

A movement is on foot to consolidate the two United Mine Workers' districts. There are about 2,800 union miners in the block mines, and nearly 9,000 in the bituminous mines. The result of a consolidation would be to make a stronger body more effective in scale conventions. In the event of a general grievance all of the mines would be under one jurisdiction.

The Indiana Legislature has passed the bill making store checks of minng and other companies redeemable in cash.

The House Committee on Mines has reported favorably the Salmon bill, providing for establishnig the office of county inspector of mines and fixing the same regulations for the mines that work 10 men as for larger mines.

The bill prohibiting foreign mining corporations owning and operating coal mines in Indiana without incorporating in the State has been killed.

IOWA.

DECATUR COUNTY.

A company, of which William Biggs, of Leon, is president, and M. Gardner secretary, has been formed to develop 2 seams of coal reported to be 3 ft, and 4 ft. 10 in. thick, recently found by sinking wells at Leon. One seam is reported to lie at a depth of 325 ft., and the other at 450 ft. The company has a capital of $30,000.

MICHIGAN.

COPPER—HOUGHTON COUNTY.

(From Our Special Correspondent.)

Franklin.—The shaft at the Junior Branch is down 1,525 ft., and sinking continues. Drifting south at the 7th, 11th, 12th, 13th and 14th levels is underway, and north at the 8th, 12th, 13th, 14th and 15th levels.

Quincy.—Eight-ton skips are in commission in Nos. 2, 6 and 7 shafts, replacing the 6-ton skips used formerly.

COPPER—ONTONAGON COUNTY.

(From Our Special Correspondent.)

Ahmeek.—The Kearsarge amygdaloid lode has been encountered 114 ft. below the bottom of the 100-ft. vertical exploratory shaft, with a jumper drill. A cross-cut east from the bottom of the shaft will be driven 140 ft. to open the lode, which is about 15 ft. wide.

Fidelity Mining Company, Limited.—This company has been organized with a paid-up capital stock of $300,000. The officers are: I. P. Griswold, of Allegan, Mich., chairman; C. G. Turner, of Grand Rapids, Mich., secretary; H. F. Marsh, of Allegan, Mich., treasurer. A tract of land in section 15, T. 50, R. 40, has been secured. It is 2½ miles northwest of the Victoria Mine. Explorations will begin next summer.

Mass Consolidated.—One head at the mill at Keweenaw Bay is in commission, treating 450 tons of rock per day, mainly from the openings west of B shaft. The output of mass and barrel copper is large. C shaft is down 450 ft., and bottomed in good ground. Thirty-five drills are in commission.

IRON—MARQUETTE RANGE.

Champion.—This mine, at Champion, has its main shaft down 1,980 ft., making it about the deepest iron mine in the world. It is owned by the Clairton Steel Company.

Cleveland Cliffs Iron Company.—This company is to sink a shaft at its new property near the Princeton at Swanzey.

Negaunee.—Shaft No. 1 of this mine, at Negaunee, now operated by the Oliver Mining Company, is unsafe, and will be abandoned. All ore now comes from shaft No. 2.

IRON—GOGEBIC RANGE.

Ashland.—This mine, now controlled by the Cleveland Cliffs Iron Company, is shipping all-rail to the Zenith Furnace at Duluth. Most of the ore is coming from the new No. 9 shaft, which will be completed to the 13th level this summer. A large pump and much new machinery have recently been put in. The mine was abandoned by the Rockefeller interests as worked out, in the fall of 1898. The Hayes Brothers reopened the mine, and soon located large bodies of ore. Their lease was purchased for a large sum by the Cleveland Cliffs Company in 1901. J. M. Longyear and others are the fee owners.

MISSOURI.

JASPER COUNTY.

(From Our Special Correspondent.)

Drilling on undeveloped land in the north part of Webb City is disclosing a blanket vein of zinc and lead. Numerous holes recently put down found this vein from 183 to 200 ft. below the surface, varying in thickness from 7 to 17 ft. The uncertainty of the shallow free ore deposits around Joplin was demonstrated anew last week by the strike at 24 ft. of a body of zinc within 150 ft. of an abandoned mine.

Church.—New machinery is being installed at the Church prospect west of Lehigh.

Missouri & Kansas Zinc Miners' Association.—This body is considering accepting a guaranteed price based on 60 per cent zinc, net dry weights, on a contract for the balance of this year. It is understood that the directors favor the proposition on a basis of $35 per ton for 60 per cent zinc, with the present scale of advance of $1 per ton, for each unit above, and $1 deduction for each unit below 60 per cent. It is a question whether sufficient producers will come together to make the proposition binding, as there is a firm belief that the smelters cannot get together.

Majestic Mining Company.—It is about 13 years since the Vivians of Swansea, Wales, abandoned mining in the Joplin District. They left behind several shafts, either of which is equal to 3 of the ordinary shafts used in zinc mining. One of these, on the land of Albert Kelly, of New York City, between Webb City and Oronogo, is being reopened by a new company, the Majestic Mining Company, composed of Webb City, Toledo, O., and Denison, Texas, parties. One car-load of zinc and one of lead has been marketed since the ground was drained. The shaft is 8 by 18 ft., divided to the 100-ft. level into 3 compartments. A blanket vein is being opened, said to average 8 ft. thick on the 160-ft. level.

Power & Co.—This company, owning a lease on the New Jersey Zinc Company's Empire Smelter reserve, in sinking a shaft encountered free ore in boulder ground at 35 ft., and the shaft has continued in the ore to 65 ft. A drill hole indicated ore from the 80 to the 180-ft. level. Three other drill holes on the 5-acre lease gave the same results.

Tennessee.—This mine, on the land of the Granby Mining and Smelting Company, northwest of Joplin, has been sold to Kansas City parties, at a price said to be $50,000.

U & I Mining Company.—This company, in Joplin, marketed its first car of zinc ore the past week.

United Zinc Companies.—Deep ore discoveries are becoming more numerous at Aurora, a recent drill test on this land indicating ore from the 160 to the 290-ft. level, and a shaft is being put down at the Sand Ridge Mine to test an ore-body on the 320-ft. level.

MONTANA.

FERGUS COUNTY.

Kendall and Barnes-King.—These mines at Kendall have been thoroughly examined by F. C. Morehouse and assistants. John B. Farish examined the property also. R. K. Neill, general manager of the Kendall, is in camp. John H. Drake, partner of John W. Gates, is also at the mine. A sale is expected.

MADISON COUNTY.

Watseca Mining Company.—This company, operating the Watseca properties at Rochester, has transferred to John Weir and John F. Brice two claims on the southern extension of the property. The consideration named is $50,000. The Watseca properties are said to be in good shape, and the new mill, with a capacity of from 100 to 150 tons, will be in operation in March.

MISSOULA COUNTY.

Tarbox.—A strike of 2 ft. of galena is reported on this silver-lead property, 3 miles from Saltese. The strike was made on the drift which is being run along the lead into the mountain from the bottom of the 225-ft. shaft.

NEVADA.

(From Our Special Correspondent.)

Both houses of the Legislature of the State of Nevada have passed an 8-hour bill regulating hours of labor in mines, mills and reduction works. The Governor is expected to sign the bill.

NEW YORK.

WYOMING COUNTY.

Oatka Mining Company.—This company has headquarters in New York City, and is largely composed of the same men as hold stock in the Worcester Salt Company, of Silver Springs. John H. Duncan, of Silver Springs, is manager. The company is to sink a shaft 1 mile east of Covington, between Warsaw and Le Roy. The breaker building for crushing and preparing the salt will be 122 by 88 ft., and the top of that part over the shaft will be 168 ft. high. The 2 lower floors will be of steel and iron, and the rest of the building of wood. The brick boiler house will contain 6 boilers, aggregating 1,400 h.p. There will be 4 engines, agregating 1,300 h.p. The building and mine will be lit by electricity. There will be 2 shafts, about 200 ft. apart, as required by law . The main shaft will be 18 ft. 2 ins. by 10 ft., and will be divided into 3 compartments, 2 hoisting shafts and an air shaft. It will be 1,200 ft. deep. In the air shaft will also be a ladder. The first 60 ft. is through top soil and gravel to keep out water. A casing of concrete 3 ft. thick will be placed about the shaft. At the bottom of this a cistern is to be excavated, and the water that accumulates will be brought to the surface by pumps. Mules will draw the cars in the mines at first, but eventually electricity will be used. Work on the plant will be commenced at once, but the plant will hardly be ready inside of 2 years. The capacity will be 1,500 tons per 10-hour day. From 150 to 200 men will be employed.

NORTH CAROLINA.

ALEXANDER COUNTY.

(*From Our Special Correspondent.*)

Hiddenite Granite Company.—This company has purchased some 500 acres of land, comprising one of the best located granite quarries in the South, including a hill 500 ft. high. It proposes to put in a side track and crushing plant, and is now receiving bids. Richard Eames, Jr., is president, and A. L. Smoot secretary and treasurer, both of Salisbury, N. C.

MECKLENBURG COUNTY.

(*From Our Special Correspondent.*)

Capps.—This gold mine and 10-stamp mill are operated by the owner, Capt. John Wilkes, of Charlotte.

MONTGOMERY COUNTY.

(*From Our Special Correspondent.*)

Gola Iola.—This gold mine continues to run the 10-stamp mill on ore that gives a profit said to be fully $15 to the ton.

Russell.—The 10-stamp mill operated by O. M. Allen, Jr., of Kalamazoo, Mich., is producing good results.

ROWAN COUNTY.

(*From Our Special Correspondent.*)

Rowan.—This copper mine, under the management of Alvin Merriam, of Chicago, Ill., is operating the 10-stamp mill and concentrator and treating some of the concentrates by the leaching process of A. E. Mead. The gold is saved by plate amalgamation.

Whitney Company.—This company, operating the Whitney gold mines at Gold Hill, has been attached for $65,000 by W. J. Oliver & Co., contractors, who claim that amount due for building 7 miles of railroad track. This in no way affects the financial ability of the Whitney Company, but is due to a misunderstanding over the contract. The Whitney Company is composed of Col. E. B. C. Hambley, president, of Salisbury, N. C., with George I. Whitney and associates, of Pittsburg, Pa. It has purchased thousands of acres on both sides of the Yadkin River, and is putting in a 40,000-h.p. plant to transmit electric power to the adjacent towns, mills and mines.

STANLY COUNTY.

(*From Our Special Correspondent.*)

Barringer.—This gold mine is being developed by the Whitney Company. Ore running high in gold was found in this mine years ago.

OHIO.

BELMONT COUNTY.

Empire Coal Company.—This company has 32,000 acres of land, 9 miles of Ohio River frontage, 100 new houses, 500 new mine cars and complete new electrical equipment at mines 1, 2 and 6. The capacity of the mines has increased from 8,000 tons in January, 1902, to 45,000 tons in 1903, and the company expects that the output for 1903 will exceed 700,000 tons. The following directors have been elected: J. R. Paull, W. L. Kann, I. W. Frank, T. H. Bakewell, Jacob Kaufmann, L. F. Newmann, W. L. Berger.

CARROLL COUNTY.

Pennsylvania & Ohio Coal Company.—This company has given T. J. Davis, of Tabor, a contract to erect a tipple near Carrollton. The mine is to have a capacity of 1,000 tons daily. J. M. Wanner and H. L. Duncan, of Pittsburg, Pa., are the principal stockholders.

PENNSYLVANIA.

ANTHRACITE COAL.

Shamokin Coal Company.—This company has obtained a new lease of the mines of the Natalie Anthracite Coal Company, near Shamokin.

BITUMINOUS COAL.

Connellsville Central Coke Company.—This company, composed chiefly of Pittsburg capital, has been incorporated with $100,000 capital. The headquarters are at New Salem, Fayette County. The company owns coking land in the Klondike region and has in operation 200 ovens, and will erect 150 additional ovens. The directors are Herbert Dupuy, John H. Hillman, John H. Neff and John P. Brennan.

Haws Coal Company.—Johnstown and Stoyestown men have formed this company to develop 3,000 acres of coal land near Holsopple station on the Somerset & Cambria Railroad. The company expects to begin work at once, and will equip its mines with the latest machinery. The officers are: President, Henry Y. Haws, Johnstown; vice-president, Dr. J. H. Gardner, Stoyestown; secretary and treasurer, David Barry, Johnstown; directors, Milton B. Young, Johnstown, and John Kurtz, Holsopple.

Hostetter-Connellsville Coal Company.—An explosion of fire-damp in this company's mine, near Latrobe, on February 27, killed several men. About 800 men were employed in the mine. The explosion was in what is known as the No. 7 flat entry, 2 miles from the main entry.

Meadow Lands Coal Company.—This company has mines at Meadow Lands. It employs 250 men, and expects to ship over 700,000 tons of coal this year. Another mine will be opened soon in the Chartiers Valley. The officers are: President, J. P. Murphy; vice-president, W. L. Dixon; secretary, J. M. Flannery; treasurer, J. J. Flannery; directors, W. D. Peck and J. S. Flannery.

SOUTH DAKOTA.

CUSTER COUNTY.

(*From Our Special Correspondent.*)

Clara Belle Mining Company.—The new shaft is 180 ft. deep. Concentrators are to be added to the Tremaine quartz mill. Frank Hebert has resigned as secretary, and is succeeded by Frank Lockhart.

Leroy Gold Mining Company.—Work has been suspended, pending the consolidation of the company with the Northwestern Mining Company.

Pepper and Comstock Groups.—The former, owned by Charles Harbach and the latter by J. Collins and William Peterson, have been opened during the last few weeks.

LAWRENCE COUNTY.

(*From Our Special Correspondent.*)

Belt Development Company.—An extension of 18 months has been obtained in the bond, and the company agrees to expend $150,000 in further development by sinking a winze 500 ft., giving a total depth of 1,200 ft.

Deer Lick Mining Company.—Work is to be resumed on the lower contact ores.

Homestake Mining Company.—Tailings from the stamp mills are being treated at cyanide plant No. 1 at a total cost of $0.353 a ton, which is claimed to be lower than at any other plant in the world. The slimes are not treated at present, but a process is being evolved by T. J. Grier, superintendent. C. W. Merrill has charge of the cyaniding department.

Rex Gold Mining Company.—Two shafts are under way. Asa Taylor, of Lead, is in charge.

UTAH.

(*From Our Special Correspondent.*)

Ore and Bullion Settlements.—The Salt Lake banks report settlements for the week ending February 27 thus: Bullion, $219,700; gold, silver, copper and lead ores, $204,900; total, $424,600.

BEAVER COUNTY.

(*From Our Special Correspondent.*)

A new post office to be known as Blue Acre has been established for the use of the O. K., Ben Harrison, Beaver Consolidated, Erie, Blue Acre and other mines in the immediate neighborhood.

Erie Company.—A strike is reported of an 8-ft. vein of copper in the shaft, near the O. K. Mine of the Majestic Company.

Horn Silver.—Arrangements are under way to handle the zinc ores now blocked out in this mine at Frisco, The American Smelting and Refining Company is willing to handle such ores. Shipping will be resumed as soon as plans are definitely settled.

The mine shipped 12 cars of ore in the week ending February 27.

Wild Bill.—This mine sent 3 cars lead ore to Salt Lake smelters in the week ending February 27.

JUAB COUNTY.

(*From Our Special Correspondent.*)

Tintic Shipments.—As reported by the samplers the receipts for the week ending February 27 are: Grand Central, 25 cars; Uncle Sam, 1 car; Ajax, 2 cars; Yankee Consolidated, 10 cars; Eagle & Blue Bell, 2 cars; Carisa, 2 cars; Mammoth, 10 cars; Dragon Iron, 1 car; Martha Washington, 2 cars; Gemini, 12 cars; Lower Mammoth, 4 cars.

Carisa.—Manager Joseph has placed an order for a 4-drill air compressor.

Centennial-Eureka.—Manager Allen has decided, it is said, to explore the ground below the 1,600-ft. level. The shaft is to be 3 compartments for at least 400 ft. deeper than present lowest workings.

Grand Central.—A lens of ore has been cut that is said to be at least 75 ft. thick, and is called the best and largest disclosure in the last 3 years. The new body of ore is reported entirely without the limits of any possible claims of the Mammoth Company.

SALT LAKE COUNTY.

(*From Our Special Correspondent.*)

Bingham Shipments.—The shipments reported for the week ending February 27 are as follows: Jersey Blue, 2 cars ore; Columbia, 1 car ore; New England Mining Company, 2 cars ore; Highland Boy, 5 cars lead ore; Storey, 3 cars ore.

Copper Belt Railroad.—This Bingham road states in its annual report that 100,000 tons of ore at least were handled and delivered to the loading station of the Rio Grande Western, and that a large up-freight from the same station has made the return trip profitable.

Highland Boy.—This smelter shipped 5 cars aggregating 300,000 lbs. bullion in the week ending February 27.

Jefferson Mining Company.—A showing of 5 ft. of ore going 10 per cent copper and $3 gold per ton is reported.

United States Smelter.—This smelter reports the shipment of 182,181 lbs. of copper bullion to refineries East in the week ending February 27.

SUMMIT COUNTY.

(*From Our Special Correspondent.*)

Park City Shipments.—The Mackintosh Sampler reports the following receipts for the week ending February 27, 3,495,510 lbs. crude ore and concentrates.

Daly-Judge.—Newton Dunyon has been appointed general superintendent of this property.

Keith-Kearns.—It is rumored that in the Apex group the Apex ledge has been opened some 300 ft. below the point where lessees have been stoping. The work has been conducted through the Hanauer tunnel.

New York Bonanza.—Mr. McSorley has accepted the superintendency of this company.

WASHINGTON.

FERRY COUNTY.

(*From Our Special Correspondent.*)

Ben Hur.—Arrangements are reported under way to lease this mine, the lessees to install machinery and expend about $6,000, which sum is to be refunded out of the sale of ore.

Black Tail.—Three car-loads of ore will soon be shipped to the smelter from Republic, when stoping, now suspended, will be resumed.

Lone Pine-Surprise.—Work is to be resumed immediately in the Lone Pine workings, at Republic. The statement is made that the company has made favorable rates with the Northwestern Smelting and Refining Company for treating 3,000 tons of ore at the Crofton Smelter.

Republic Consolidated.—Patrick Clark, president, was in Republic recently, and examined the mine above the No. 4 level. The sampling of the mine is still in progress. Owing to the freezing of the company's flume, there is no water for the boilers, and the winze is not yet drained. Mr. Clark returns in about 10 days, accompanied by a mining engineer from Eastern Canada, and will make a final report on the mine.

Zala M.—From this mine, at Sheridan, since resuming work a few weeks ago, 200 tons of ore have been shipped. The snow roads between the mine and railroad have broken up, and shipments are temporarily suspended. The working force of 16 men is exploiting the vein on the 100, 200 and 300-ft. levels.

WEST VIRGINIA.

RALEIGH COUNTY.

On February 25 a large body of miners, over 200 members of or sympathizers with the United Mine Workers, who had been for some time interfering with work at mines in this county, where the strike of last summer has never been formally declared settled, fired on deputy sheriffs and United States marshals, who were attempting to arrest men at Stanaford, charged with violating an injunction issued by Judge Kelly. In the fight 3 strikers were

instantly killed and a number wounded. Over 75 men were subsequently arrested and taken to Beckley for examination. The injunction the men violated was issued last summer at the suit of the Chesapeake & Ohio Coal Agency. It restrained strikers from trespassing on the property of various coal mining companies, or with intimidating their employees. The posse that captured the rioters was led by United States Deputy Marshal Daniel W. Cunningham.

FOREIGN MINING NEWS.

AFRICA.

NATAL.

The Mines Department reports the total output of coal in the colony for the month of December at 45,251 tons, a decrease of 4,161 tons, as compared with December, 1901. The total number of men employed at the collieries was 3,715, of whom 202 were whites, 1,889 negroes and 1,624 East Indians. Exports of coal during the month were 92 tons; and 13,920 tons were sold to steamers at the port of Durban.

CANADA.

BRITISH COLUMBIA—CASSIAR DISTRICT.

Grafter.—This copper mine, at White Horse, is the first mine to ship regularly in the district. Its present output is 10 tons daily, which is sacked and sent to the Crofton Smelter.

BRITISH COLUMBIA—EAST KOOTENAY DISTRICT.

Crow's Nest Pass Coal Company.—This company has sold the stock of general merchandise in the company's stores at Fernie, Michel and Morrissey, to a local company, of which A. B. Trites, of the London & Liverpool Company, of Fernie, and Mr. Woods, manager of the coal company's store at Morrissey, are members. Henceforth the company will devote itself exclusively to coal mining.

The strike at the company's mines shows no changes. The miners have issued a statement making various allegations, but the sum and substance of the whole matter appears to be that Manager Tonkin refused to recognize the miners' union.

BRITISH COLUMBIA—SLOCAN DISTRICT.

Slocan Ore Shipments.—The total amount of ore shipped from the Slocan and Slocan City mining divisions for the year 1902 was, approximately, 28,000 tons. From January 1 to February 14, 1903, according to the New Denver *Ledge*, the shipments have been as follows:

	Week.	Total.
American Boy	..	215
Antoine	..	16
Arlington	..	40
Black Prince	..	35
Bondholder	..	1
Bosun	30	120
Dayton	2	2
Enterprise	..	160
Fisher Maiden	20	120
Idaho	..	21
Ivanhoe	..	240
Monitor (Jan.)	..	144
Ottawa	20	100
Payne	60	566
Queen Bess	..	20
Rambler	..	120
Reco	..	70
Republic	20	20
Slocan Star	..	21
Total tons	152	2,110

NOVA SCOTIA—CAPE BRETON.

Nova Scotia Steel and Coal Company.—This company's Sydney No. 2 mine has been equipped with modern machinery, including a long picking belt, and revolving and shaking screens. John Johnson is manager.

MEXICO.

SONORA.

(*From Our Special Correspondent.*)

Creston Colorado Company.—It is stated on reliable authority that the rumors and published statements to the effect that this company has disposed of its properties at Minas Prietas, to a syndicate headed by John W. Gates and John A. Drake, are wholly unfounded. The company is operating its properties the same as usual, and no negotiations of any kind looking toward the sale or disposition of its properties are under way or are contemplated.

MINING STOCKS.

(Full quotations are given on pages 394 and 395.)

New York March 4.

Trading in mining shares is of a desultory character, and from appearances the coppers cannot hold their recent advances. Better prices, however, are expected, as the metal market shows a hardening tendency. Amalgamated Copper shows the customary pool transactions, but at lower prices, $74@$70½ being the extremes. Less profit-taking is manifest in Anaconda, which sold at $30.75 to $29. Tennessee holds its own on curb, selling up to $32⅛ in anticipation of larger earnings in the future. This company was originally floated as a private enterprise by the Lewisohns, of the United Metals Selling Company, but recently others have obtained large interests in the mine. United, better known as Heinze's United, sells in small lots at $30@$27, but it seems difficult to pivot the stock above $30, which is considerably less than the lowest price quoted this week for Amalgamated. British Columbia is hardly visible, which is significant as the company only recently increased its capital stock to strengthen its position. White Knob, of Idaho, is likewise uninteresting, though it has sold at $12@$10.

In Colorado gold stocks quotations are weak. Cripple Creeks are feverish, owing to the brewing trouble with the labor unions. Portland slumped to $1.40. Elkton to 39c. and Isabella to 22c.

Homestake Gold, of South Dakota, sold 50 shares at auction on February 25 at $64. This company pays regular monthly dividends of 25c. per share, which is at the rate of 3 per cent per annum on the capital stock, or about 4.7 per cent on $64, the present selling price.

Ontario Silver, of Utah, sold at $6.50, and Horn Silver lost 50c. at $1.

The Comstocks are in fair request, and fluctuations of 5 to 10c. in the higher priced stocks causes little apprehension. Best & Belcher brought $2.60; Ophir, $2.25@$2.40; Consolidated California & Virginia, $2.30@$2.20; Confidence, $1.60, and Utah, $1.40. An assessment of 5c. has just been levied by Occidental, which is quoted at 50c. Sierra Nevada brings $1.15, though a 10c. assessment has just been collected. Caledonia, which levies 30c. in assessments annually, now sells at $2.

Recently the New York Stock Exchange listed $584,000 additional 6 per cent preferred stock of the General Chemical Company, which makes $10,000,000 now called. This is the so-called heavy chemical combination, and is one of the few industrial aggregations that pay dividends on both the preferred and common stock.

Boston. March 3.

(*From Our Special Correspondent.*)

The metal market and the copper share market are at loggerheads. The former is strong, while the latter is weak. The late sharp bulge is said to have been premature, as the time scheduled by the powers that be was to have been after the adjournment of Congress and of the Montana Legislature. The wise ones on the Street still predict that an old time copper boom is due this spring. At present, however, the banks are not seeking copper shares as collateral. Some brokers on the floor of the exchange are paying 6@6½ per cent to have copper shares carried—a pretty stiff rate, with call money 5@5½ on the Street.

Copper shares have been dull and recessions, heavy in cases, are to be recorded for the week. The failure of a brokerage house to-day, which has stood as sponsor for the Mass Mine, had a depressing effect, and stocks suffered severe declines. There has been a pretty thorough shaking out of weak accounts, and it is expected that the recovery will be sharp. Large blocks of Mass Mining were offered Monday, which depressed the price $4 to $10.50. To-day the stock touched $9.25, recovering to $10.50. If all can be believed there is considerable friction in the management, and one director is known to have sold all his holdings. It is also said that the last assessment has not all been paid in, and some of the directors are offenders. The stock sold as high as $37.62½ in 1901.

The 50c. increase in the Wolverine dividend to $2.50 is looked upon as warranted, as the company has spent all the money needed. The stock is the strongest on the list, selling at $71@$72 per share—practically its highest. Copper Range has broken $7.75 to $66.50. The 4th head at the Baltic Mill is in commission, and the 3d at the Champion. Adventure is off $2.75 to $12. Advices to-day are that the force has been reduced by 60 men. The rock mined is being selected, and is now running 1 per cent mineral. The Winona assessment of $1 per share is as anticipated, although there was quite a time between its announcement and the time of levying, February 16. The stock has fallen $1.62½ to $7. United States Mining has settled $1 to $25. The report of the trustees, R. D. Evans and S. W. Winslow, was well received. It substantiates the claims of the original promoters, E. A. Clark and W. C. Coolidge. The total amount expended since January 1, 1900, has been $1,706,164, of which $892,987.03 has been for construction and operation of the smelter and its auxiliary works, and $813,177 for purchase of new properties, etc. The total amount thus far actually received from the sale of bullion is $382,500, and the amount still unpaid is estimated at $69,319. The indebtedness (exclusive of the bonds) consists of notes amounting to $525,000, and accounts payable estimated at $75,000; to offset which there is on hand cash $138,525, and the amount unpaid on bullion shipped o ron hand estimated at $175,000.

Bingham has fallen $3.87½ to $33; Centennial, $3.12½ to $28.25; Mohawk, $4.75 to $51; Osceola, $5 to $71; Parrot, $3.25 to $29.50; Quincy, $9 to $113; Tamarack, $8 to $180; Trinity, $1.37½ to $12, and Utah, $3.37½ to $28.12½. All show slight recoveries. Trimountain has fallen to $97.25 ex-dividend. Old Dominion is off $1.75 to $20.25. The annual report is expected this week. Isle Royale has lost $1.50 to $13.50. The Quincy Mine's February product was 1,046 tons of mineral; Atlantic's, 297¾ tons, and Wolverine's, 485¾ tons. Calumet's is estimated at 3,200 tons; Tamarack, 630; Osceola, 430; Mohawk, 354; Adventure, 165; Mass, 123, and Isle Royale, 108 tons.

Colorado Springs. Feb. 27.

(*From Our Special Correspondent.*)

A week of uncertainty followed the declaration of the strike against the mills of the United States Reduction & Refining Company. The market, consequently, was soft and trading reduced proportionately. The impression rules generally that the firm stand taken by the United States Company and by the Portland and the Telluride companies, the latter refusing to grant the demands of the mill-men, will do much to help the situation.

The market has held fairly well, all things considered. It is to be noted, however, that support has been withdrawn from a number of the market leaders, such as El Paso, Elkton, Isabella and Portland.

El Paso was the first leader to suffer, declining from 65 to 59½c., the lowest selling being done to-day. Elkton dropped from 38½ to 37c., and recovered to 38c., although the closing quotation to-day was 36½c. bid, with 38c. asked. Already another factional fight has started between the same parties, who threatened to disrupt the company a year ago. Isabella broke badly from 21½c. on the 21st to 18⅞c. on the 25th, when it turned and rallied, reaching 19½c. to-day. Something over 35,000 shares changed hands. Moon Anchor sold again at 9@8c., closing to-day with 8c. bid and 11c. asked; no sales. Portland sold at $1.43 @$1.38, touching the low register to-day.

Salt Lake City. Feb. 27.

(*From Our Special Correspondent.*)

The stock market this week declined slightly. Of those dropping down a few notches is Daly, to as low as $3.85, having opened at $5.12@$5. Daly West fluctuated but 20c. either way, closing at $39.65 @$38.80; Consolidated Mercur was at $1.73 high, but dropped to $1.68½ low. Grand Central retreated to $4.85. Among those registering gains were Daly-Judge, La Reine, New York Bonanza, Tetro and Victor. The heaviest traders were La Reine, 596,000 shares, at 5@4½c.; Martha Washington, 48,900, at 7@6c.; New York Bonanza, 27,300 shares, at 28½ @21½c.; California, 8,700 shares, at 22½@19½c.; Wabash, 9,145 shares, at 42½@35c. The week's business amounted to 234,420 shares, which brought $146,602.

San Francisco. Feb. 28.

(*From Our Special Correspondent.*)

The Comstocks are in moderate request, and prices are considered good. Some quotations noted are Consolidated California & Virginia, $2.10@$2.15; Mexican, $1.45@$1.50; Sierra Nevada, $1.10@ $1.15; Union, $1.15; Ophir, $2.10, and Hale & Norcross, $1.05@$1.10.

Oil shares are strong, as the inquiry is good. Sterling brought $3.50, Home $3.20, San Joaquin, $7⅞, and Sovereign 44c. A number of lower priced shares have also been traded in on the California Stock and Oil Exchange.

COAL TRADE REVIEW.

New York, March 5.

ANTHRACITE.

The demand for anthracite continues strong throughout the West and at many interior points in the East. Along the seaboard, however, most yards either have coal enough in hand to last till April 1 or are so situated that they will have no difficulty in getting what they want. Consequently, the seaboard market is decidedly quiet. The matter of spring prices is the subject most discussed in the trade at present, and there is much speculation as to what the large mining and railway companies will do. It is evident that if the Anthracite Commission decides that the miners are entitled to substantial increases in wages the operators will consider incerased prices for coal justifiable. In the lack of any certain knowledge of what the Commission will decide the operators will defer announcing spring prices, and it may be that they will make no announcement until after April 1. The operators feel that since public opinion, as voiced by the daily press last summer, favored higher mining costs, the public must expect to pay more for coal.

There is but little doing in anthracite in Lake Superior territory. At St. Paul domestic sizes are selling at retail as high as $20 per ton. At the head of the lakes anthracite is practically out of the market. In Chicago territory anthracite continues in

short supply, and docks are practically bare. This means a heavy movement by water as soon as lake navigation opens. Along the lower lakes and in Canadian territory demand has lost much of its urgency, trade is easier than at any time this winter, and prices are getting down to normal figures. At Cleveland coal retails for $7.50. In the all-rail trade between the lakes and the seaboard demand is strong at certain points. Along the seaboard demand generally has fallen off. Egg, stove and nut sizes are selling at retail for $8 and less at Boston, and $6.25 at New York. The f. o. b. price, New York Harbor shipping port, is $5.

NOTE OF THE WEEK.

At the annual meeting of the Delaware, Lackawanna & Western Railroad Company on February 24 these managers were elected: Samuel Sloan, chairman; Frederick W. Vanderbilt, William W. Astor, [illegible] Higgins, Henry A. C. Taylor, J. Rogers [illegible]well, George F. Baker, William Rockefeller, Hamilton McK. Twombly, James Stillman, M. Taylor Pyne, Harris C. Fahnestock, Frank Work, John D. Rockefeller, Jr.

Executive Committee—Samuel Sloan, chairman; Hamilton McK. Twombly, George F. Baker, William Rockefeller, William H. Truesdale, president.

Officers—Chairman of the board of managers, Samuel Sloan, New York; president, William H. Truesdale, New York; vice-president, in charge coal department, E. E. Loomis, New York; vice-president, in charge of traffic department, B. D. Caldwell, New York; secretary and treasurer, Fred. F. Chambers, New York; assistant secretary and treasurer, Arthur D. Chambers, New York; general attorney, W. W. Ross, New York; general superintendent, T. E. Clarke, Scranton; general auditor, O. C. Post, New York; general freight agent, P. J. Flynn, New York; chief engineer, L. Bush, Hoboken; superintendent coal mining department, R. A. Phillips, Scranton; superintendent motive power and equipment, T. S. Lloyd, Scranton.

BITUMINOUS.

The seaboard bituminous market is easy, with speculative prices ranging around $2.90@$3, f. o. b. New York Harbor shipping port, for the poorer grades of Clearfield, while the better grades of Clearfield are 10@15c. higher. There is apparently a scarcity of the higher grades of coal, particularly of such grades as are used by blacksmiths. The contract season is on and some contracts have been closed already. We note a wide variation in prices named, the prices varying according to the quality of the coal and ranging from $3.25 to $3.90, f. o. b. In the majority of cases consumers show no anxiety to close contracts at once, and are rather holding off. However, the memory of last year's conditions is still fresh, and will certainly have an effect in inducing consumers not to hold off too long. Producers of the higher grades of coal will probably have little trouble in closing all the contracts they care to take, but with producers of lower grades the situation is different, as the possibility of getting foreign coal at low alongside prices is receiving the attention of consumers, and will be considered closely before contracting for domestic coal.

The labor situation in some of the fields shipping to tidewater is rather threatening just now. Many operators have signified an intention of advancing wages, some companies saying they will give an increase of 20 per cent. However, the great question at present seems not to be the rate of wages, but rather recognition of the union. If the miners insist on making this an issue it is altogether likely that the operators will not give in without a trial of strength. Fortunately, the public would not be greatly inconvenienced unless the strike affected all fields shipping to tidewater, which seems hardly probable in view of the outcome of last year's strike in West Virginia and of the strike in the George's Creek field 3 years ago.

In the far East the market is still easy, owing to receipts of foreign coal, though these receipts are now falling off. Along Long Island Sound demand is a little stronger and there is a slight speculative buying. Trade at New York Harbor points is easy. The all-rail trade is taking considerable coal, and consumers who can are accumulating stocks.

Transportation from mines to tidewater is prompt, coal running through in less than a week. Car supply is from 25 to 35 per cent of the demand. In the coastwise vessel market, vessels are in plentiful supply. Freight rates from Philadelphia are $1.05@$1.15 to Boston, Salem and Portland, and 85c. to Providence, New Bedford and Long Island Sound. From New York rates are 85@90c. to Boston, Salem and Portland, and 65@70c. to Providence, New Bedford and Long Island Sound. Barge freights about New York Harbor are 20c.

Birmingham. March 2.

(From Our Special Correspondent.)

The inability of the transportation companies to move coal as quickly as it is loaded on cars is giving companies depending on this section for their fuel some worry. During the past week representatives of some of the railroad systems in the South using Alabama coal have been spending day after day here looking after their fuel contracts. There is demand for every ton of coal mined. Rains during the latter part of the past week have had some effect on the output.

In the vicinity of Leeds, in the northeastern part of Jefferson County, much prospecting is being done for coal, and the probabilities are that when the Seaboard Air Line, now building from Atlanta, Ga., to Birmingham, gets through, several mines will be opened in that locality. Contracts are being made for coal through the summer, and the prospects are good. Shipments will be good to the seaport towns in the South through the entire year, and much coal will be accumulated this summer to avoid, if possible, a repetition of the hustling done last winter to keep up regular supplies.

The coke demand continues strong. The production of coke in Alabama is just holding its own.

Chicago. March 2.

(From Our Special Correspondent.)

Mild weather, except for a few brief cold waves, and improved transportation, have brought down the prices of leading grades of coal during the week 50c. to $1, for car-load lots. The railroad condition is said to be so much better that preference is no longer given to coal over other freight on Western lines. For the city, trade is getting back to a normal level, and some dealers even complain of dullness. Anthracite alone is in scant supply, but lake navigation will open in a month, and then it is expected that supply will at once become plentiful enough for immediate needs.

Car quotations to-day are: Hocking, $4.50 (a drop of 50c.); Youghiogheny, $4 (a drop of $1); West Virginia, $4 (a drop of 75c.); smokeless, $5 (a drop of 50c.); Indiana and Illinois lump and egg, $3 (a drop of 50c.). The prospects are for still further reductions until the normal level is reached.

Cleveland. March 3.

(From Our Special Correspondent.)

The coal operators of the Ohio, Pennsylvania and West Virginia fields held a meeting at the Hollenden Hotel during the week, and talked over prices for the coming year. At the conclusion of the meeting, announcement was made that a committee had been appointed to talk with the Lake Carriers' Association to see what action would be taken on lake freights. This is an exceptional step, as hitherto the lake rate has depended upon the prices of coal and the operators have taken the initiative. It is understood that prices were suggested at the meeting which will probably be adopted, but these are not stated. The understanding is, however, that prices incline toward an advance. Vessel interests are demanding the extreme freight rate as usual, and are looking for 50c. between Duluth and Ohio ports. The coal situation in this territory has been relieved during the week, and it begins to look as if the railroads would be able to meet most of the demands upon them. There will be a big demand for coal for the lakes toward the end of this month, and the railroads are preparing for it.

Pittsburg. March 3.

(From Our Special Correspondent.)

Coal.—Prices have been practically fixed for the season, but no official announcement will be made. Large contracts were closed this week by the combine and independent interests at the following prices, f. o. b. mine: Inch and a quarter, $2.20; three-quarter inch, $2.10; run-of-mine, $2. Lake shippers all will quote the following prices for the season, with the usual differentials in favor of Ohio operators: Inch and a quarter, $2.55; three-quarter, $2.45; run-of-mine, $2.35. This is an advance over the rates for last season of 40c. a ton. The district dead work scale was settled on February 27, after a conference between representatives of the United Mine Workers and the operators lasting two weeks. The scale is advanced 12½ per cent.

Connellsville Coke.—Both production and shipments fell off, and higher prices were obtained for prompt coke. Furnace coke sold at $5.50@$6, and few contracts for extended delivery were made at a lower figure. The *Courier*, in its last report, gives the production for the previous week at 241,125 tons. The shipments for the week aggregated 8,548 cars, distributed as follows: To Pittsburg and river tipples, 3,298 cars; to points west of Pittsburg, 4,228 cars; to points east of Connellsville, 1,021 cars. This was a decrease of 1,701 cars compared with the shipments of the previous week.

Foreign Coal Trade. March 5.

Exports of coal and coke from the United States in January are reported as follows:

	1902.	1903.	Changes.
Anthracite	103,242	119,748	I. 16,506
Bituminous	402,225	329,840	D. 72,385
Total coal	505,467	449,588	D. 55,879
Coke	32,609	20,751	D. 11,858
Totals	538,076	470,339	D. 67,737

The coke exports are chiefly to Mexico. The distribution of the coal exported was as follows:

	1901.	1902.	Changes.
Canada	305,643	335,006	I. 29,363
Mexico	41,022	32,686	D. 8,336
Cuba	43,294	36,792	D. 6,502
West Indies	44,537	28,573	D. 15,964
European Countries	35,759	1,438	D. 35,321
Other countries	35,212	15,093	D. 20,119
Total	505,467	449,588	D. 55,879

The coal trade with Europe has almost disappeared, owing to causes well understood.

Imports of coal into the United States are reported as follows for the month of January:

	1902	1903.	Changes.
Canada	145,014	172,221	I. 27,207
Mexico	1,188	5	D. 1,183
Great Britain	14,380	310,665	I. 296,285
Other Europe	.....	300	I. 300
Japan	40	.....	D. 40
Australia	34,370	17,231	D. 17,139
Other countries	125	.....	D. 125
Totals	195,117	500,422	I. 305,305

Of the coal imported from Great Britain this year 54,249 tons were classed as anthracite; all the other imports were bituminous coal. The increase this year was entirely in imports on the Atlantic coast.

Ocean freight rates on imports from Great Britain are about what were paid a year ago on exports to Mediterranean ports from the United States. A large part of the charters made in Great Britain this year were for Boston or other far Eastern ports. The rates were from 7 to 8s. ($1.68@$1.92).

Imports of fuel into France for the year ending December 31 were as follows, in metric tons:

	1901.	1902.	Changes.
Coal	12,496,058	11,856,980	D. 639,078
Coke	1,429,564	1,280,740	D. 148,824
Briquettes	.....	503,730	I. 503,730
Totals	13,925,622	13,641,450	D. 284,172

Briquettes were not reported separately in 1901, but were included in coal. The coal imported was chiefly from Great Britain; the coke and briquettes from Belgium.

French exports of coal in 1902 were 828,860 tons, against 843,876 tons in 1901, and 1,132,152 tons in 1900. These were mostly to Belgium and Switzerland.

The total output of coal in Belgium in the second half of 1902 was 11,856,300 tons, which is an increase of 878,900 tons, on the output for the second half of 1901.

Messrs. Hull, Blyth & Co., of London and Cardiff, report under date of February 21, that the Welsh coal market continues dull and inactive. Prices remain easy for all descriptions of coal. Quotations are: Best Welsh steam coal, $3.48@$3.54; seconds, $3.42; thirds, $3.36; dry coals, $3.24; best Monmouthshire, $3.18@$3.24; seconds, $3.12; best small steam coal, $2.10; seconds, $1.98; other sorts, $1.80.

The above prices for Cardiff coals are all f. o. b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f. o. b. Newport, exclusive of wharfage, but inclusive of export duty, and are for cash in 30 days, less 2½ per cent discount.

The freight market continues fairly active, and rates remain unchanged in nearly every case. Some rates quoted from Cardiff are: Marseilles, $1.60; Genoa, $1.68; Naples, $1.62; Singapore, $2.52; Las Palmas, $1.50; St. Vincent, $1.68; Rio Janeiro, $2.46; Buenos Aires, $1.92.

IRON TRADE REVIEW.

New York, March 5.

The iron trade shows some improvement, particularly as regards the demand for pig iron and for certain finished products, notably bars and structural shapes. The market for plates also is more active. Coke supply is still bothering producers, furnaces at Chicago and in the Valleys that had to shut down in December are still idle. Transportation is showing some improvement, however, and after the spring freshets have fallen may be expected to be better than in months. The possibility of labor troubles is somewhat threatening. The advance granted the bituminous coal miners is likely to lead for substantial increases from men in many other lines of industry, and already a strike of large proportions in the building trade seems impending.

Birmingham. March 2.

(From Our Special Correspondent.)

The inquiry for iron, delivery after July 1, is not very extensive as yet, but encouraging. Shipments are healthy, the railroads exerting themselves to move the product as quickly as it is loaded.

The production in Alabama is keeping up well. The Sloss-Sheffield Steel and Iron Company expects to

be able to blow in Philadelphia furnace at Florence during the latter part of this week. The new furnace of the Alabama Consolidated Coal and Iron Company at Gadsden is completed, and will probably be blown in during the next fortnight. There is talk of the Lacey-Buek Company blowing out Trussville furnace in order to make some extensive repairs. The Lacey-Buek Company recently bought some valuable ore mines in Etowah County, and its now figuring on the construction of 200 more coke ovens at Trussville.

The following pig iron quotations are given: No. 1 foundry, $20; No. 2 foundry, $18.50@$20; No. 3 foundry, $18@$18.50; No. 4 foundry, $17@$18; gray forge, $16.50@$17; No. 1 soft, $20; No. 2 soft, $18.50@$20.

The Jenifer Furnace Company is being reorganized, the following interests now being identified therein: G. Schumacher, of New York, president of the Central Foundry Company in Alabama; Ed. F. Neidecker, Charles Gezelschap, F. Hoffman, of Milwaukee, Wis.; C. R. Schmidt, of Baltimore, and Capt. W. H. Weller, of Anniston, Ala. The annual meeting of the stockholders of the Sloss-Sheffield Steel and Iron Company will be held in Jersey City, March 17. Two places on the board of directors will be given to Canadian stockholders. Adolphus Low, one of the first stockholders in the Sloss-Sheffield Company, has been in the Birmingham District looking over the properties of the company.

The foundries and machine shops in the Birmingham District report steady work, and more in sight. Their conditions never were better than right now.

Buffalo. March 3.

(*Special Report of Rogers, Brown & Co.*)

Many indications point to a heavy buying movement in the near future. Inquiries and sales are now of considerable size.

Prices are very firm and, in fact, seem to be advancing. Quotations on foreign iron are considerably higher. All consumers of pig iron are very busy, running to full capacity with scarcely an exception. We quote on a cash basis, f. o. b. cars Buffalo: No. 1 strong foundry coke iron, Lake Superior ore, $24.50; No. 2 strong foundry coke iron, Lake Superior ore, $23.25@$24.25; No. 1 soft Southern, $24.75; No. 2 soft Southern, $24.25; Southern charcoal, $30@$35; Lake Superior charcoal, forward deliverdy, $26.75.

Chicago. March 2.

(*From Our Special Correspondent.*)

Pig Iron.—As a whole, trade is decidedly better than last week, orders being more numerous and for larger deliveries. Most sales continue to be of Southern, Northern being scarce and well sold out up to the fall. The chronic difficulty about coke supply continues; the cold weather set back shipments to the West, exasperating both foundrymen and furnace proprietors. At South Chicago furnaces have been closed since December; the Illinois Steel Company has 6 out of blast, and the Iriquois Iron Company one. Neither company knows when it will be able to start up again. Coke continues firm at $9.50@$10. The higher price is readily obtained, according to some firms, for all that can be secured.

The general supply is inadequate and bound to be inadequate, until better weather enables the railroads to take better care of all freight. Prices of iron continue substantially unchanged, to-day's quotations being: No. 1 Northern, $23.50@$24; No. 2, $23@$23.50; No. 3, $22.50@$23; No. 1 Southern, $23.35@$23.85; No. 2, $22.85@$23.35; No. 3, $22.35@$22.85. For early delivery—the above prices are for the third quarter of the year—there are premiums ranging from $3 to $5, though such lots are as a rule small. The demand for early delivery seems to be increasing rather than diminishing.

Cleveland. March 3.

(*From Our Special Correspondent.*)

Iron Ore.—The Ore Association is having the various ores which shall be produced from the Lake Superior District this year, analyzed to determine the value of each on the market. This is a radical departure. The movement from the lake stock piles has been light. This is said by some to indicate a light demand for ore during the earlier part of the coming season. Nothing definite is said about the freight rates.

Pig Iron.—The demand for spot foundry iron is still in excess of the supply. Relief is sought in other markets, principally in the south, where there is a limited amount available. Prices are well up, and $25 is the minimum for No. 2, Valley furnace. The buying for first half delivery is limited for the same reason. On what sales are being made the price is from $23 for first half, Valley furnace. Business for the second half is picking up, but it is not very heavy, as many buyers seem to be holding back. Basic seems to be of more interest, and inquiries are coming in freely, but the material is so scarce. The consumers are taking off-iron to piece out and are getting material from whatever source possible. Nothing is said of prices by producers. Bessemer producers are off of the market for the time being, and while there are stories of sales these have not been officially announced. The price holds at $23, Valley furnace, for first half delivery.

Finished Material.—The structural market has been brisk, with better prospects than for two or three months. The difficulty is to get any material, except on contracts, and on these shipments for the spring trade are beginning. The smaller mills get all the business they can take care of at premiums, and the market has an upward tendency. Prices hold at 1.60c., Pittsburg, for the larger mills; 1.85c. and 1.75c. at the mill for the smaller concerns; with jobbers getting 2.25c. The plate trade is rather easy, as the big buying seems to have stopped for the time being. Prices have not changed from 2c. at the mill for spot delivery and 1.60c., Pittsburg, for time contracts, with the larger concerns. The sheet trade is buoyant and strong, and prices have an upward tendency, the market being better than for weeks. Prices are firm on the old basis of 3.10c.@3.25c. for No. 27 black sheets, out of stock. The bar trade is also brisk. The bar steel mills are supplying the deficiency caused by the withdrawal of the steel billet supply of the Steel Corporation. Prices have not changed, being 1.80c., Pittsburg, for bar iron; 1.60c., Pittsburg, for bessemer bar steel.

Old Material.—The scrap trade has been looking up with a better demand. Sales have been heavier than recently.

Philadelphia. March 4.

(*From Our Special Correspondent.*)

Pig Iron.—The activity elsewhere has stimulated an interest in pig iron in this market which otherwise would not have shown itself. Our people are inclined to do nothing, except in basic pig, which is in demand. Activity is expected next in bessemer. In forge and foundry iron, notwithstanding the activity in other markets, comparatively little has been done here, although brokers and makers say that they have inquiries. Prices are practically unchanged. Buyers feel a little easier, as their inquiries for iron are not turned down so unceremoniously as a few weeks ago. Makers are more desirous of accommodating new customers. Very little has been done for several days in foreign pig, and it is impossible to say whether the advance of 50c. to $1 a ton has had anything to do with it. In cargo lots, German iron has been quoted at about the same figures as a week ago, though importers say there is every indication of an advance. Small lots of low phosphorus have sold at $22. Quotations for No. 1 foundry iron are close to $24.50; No. 2 is strong at $22.50; No. 2 plain has sold at about $22. Gray forge averages $20. Basic is $20.50@$21. Small lots of Middlesboro No. 3, delivered, $21.50; Scotch, $23.50; in cargo lots, No. 3 Middlesboro is quoted at $18@$18.50. Importers are advising their customers not to delay placing orders.

Steel Billets.—Foreign steel billets were quoted today at $27.50, with domestic steel at $33.50, delivered. There appears to be an upward tendency both at home and abroad, but it does not appear that much business has been definitely closed.

Merchant Bar.—The present price is regarded as too low. Refined iron is quoted at from 1.95c. for carload lots to as high as 2.20c. for smaller lots. Steel bars are selling at 1.90c., and mill men think that for small lots they will soon be able to get 2c.

Skelp Iron.—Skelp iron has picked up a little, but there appears to be a competition between Eastern and Western skelp makers, which keeps margins unpleasantly narrow.

Merchant Pipe.—Local agents for merchant pipe report a moderate improvement in Philadelphia territory. Urgent buyers are not granted concessions, but it is understood that in a large way concessions are to be had.

Boiler Tubes.—The movement in boiler tubes shows little change. The situation is very satisfactory.

Cast Iron Pipe.—Plants in this vicinity find no difficulty in accumulating business, and managers are figuring on some very desirable contracts.

Merchant Steel.—Agents report that consumers in general continue buying in a small way in the vain hope of concessions.

Plate.—Prices are very strong, and the smaller buyers are still obliged to beg for material for prompt delivery. A great deal of plate material will be wanted in this locality. The eastern Pennsylvania mills are well sold up. One-quarter inch stuff averages 2c.: flange, 2.10@2.20c.; fire-box, 2.30c.; marine, 2.35c.

Structural Material.—A number of small buyers have just discovered that to get what they want they must pay for the accommodation. Mills are now urged for deliveries by certain large interests, who want to get everything they have ordered to push construction work in April.

Old Rails.—There is an urgent inquiry at present, and the quotation is given to-day at $25. It does not appear that there are any old steel rails to be had.

Scrap.—Considerable heavy steel scrap is being delivered, but it was all ordered some time ago. No recent purchases are heard of. Choice railroad scrap sells at $23.50. Low phosphorus scrap is wanted badly, and will bring $27.50. Some country scrap has been heard of, but $20 will not buy it. Machinery scrap is changing hands at $20@$21.

Pittsburg. March 3.

(*From Our Special Correspondent.*)

The operation of the blast furnaces in the valleys continues irregular, owing to unsatisfactory deliveries of coke, but the demand for pig iron is increasing. There have been an unusual number of inquiries during the week, and some important sales were made. The United States Steel Corporation is in the market at last, according to reports, and is prepared to open negotiations with the merchant furnaces for a heavy tonnage for delivery during the last half of this year and the first half of next year. A low price, of course, will be insisted upon, owing to the large tonnage to be contracted for and the extended shipment. It is said the furnaces will be willing to close a deal with the Corporation at a figure somewhat less than $20 a ton at the furnaces. Gray forge and foundry iron are in better demand and slightly lower prices are named for second half delivery. Basic also is active, and a large sale was made during the past few days for shipment before July 1. The freight situation shows no improvement and the delays in delivering both coal and coke seriously interfere with the operation of mills and furnaces. High prices are still paid for spot coke, but it is impossible to get enough to meet the requirements of the valley furnaces and a number are still banked.

The open-hearth steel plants in the Pittsburg District are greatly hampered through a shortage of heavy melting stock. Some large contracts have been placed, but it is impossible to get satisfactory deliveries. It is reported that on a large order just given the ruling rate was shaded, and that on long time contracts heavy melting stock can be had at $20@$20.50. Heavy cast scrap is quoted this week at $18@$19. Old steel rails for re-rolling are in good demand, and bring from $22@$23. Old iron rails are much higher, $25 being the minimum price. The demand for iron bars is unusually heavy, the Republic Iron and Steel Company and other makers having booked orders for many months ahead at the base price of 1.80c. at mill or 1.85c. delivered at Pittsburg. There is still talk of a consolidation of the small iron bar interests, but nothing definite has been done. The outlook never was better, and if the Amalgamated Association of Iron, Steel and Tin Workers succeeds in securing a continuance of the existing sliding scale in the union rolling mills the puddlers will be assured of the present remarkable puddling rate of $6.12½ a ton, or possibly $6.25 for another year.

Rumors continue to be circulated regarding the probable absorption of the Jones & Laughlin Steel Company by the United States Steel Corporation. It is generally believed here that the deal will soon be put through, although an official denial of the reports was again made to-day. It is pointed out that the Union-Sharon deal was as emphatically denied. When the Jones & Laughlin Steel Company was reorganized last year a bond issue of $10,000,000 was authorized for improvements and extensions. During the week it was given out that plans had been completed for the expenditure of the entire amount. There is doubt, however, as to the carrying out of these plans. According to reports the Corporation made an offer of $60,000,000 for the entire holdings, but the company insisted on $80,000,000. This report lacks confirmation. The Corporation has announced heavy improvements for the tube mills, which include the building of a large plant at Lorain, O., to cost about $8,000,000. The tube plant at Sharon recently acquired, is to be dismantled and the equipment will be moved to one of the other plants of the National Tube Company.

Pig Iron.—Demand is unusually active and prices are firm. For early delivery bessemer is quoted at $21.50@$22, Valley furnace. For second half delivery, on a good order, $20.50, Valley, can be done. A leading local interest has bought 25,000 tons of basic pig iron for delivery up to July 1 at $20.50, Valley furnace. Foundry No. 2 for second half is quoted at $22, Pittsburg, and gray forge at $20.75@$21, Pittsburg. Several thousand tons were sold.

Steel.—The steel market is quiet, bessemer steel billets being held at $30, and open-hearth billets are quoted at $31@$32. The plate market is very active and sales agregating 15,000 tons were made during the week at the base price of 1.60c. Steel bars continue in good demand, and a large tonnage has been contracted for within the past few days.

Sheets.—The sheet market continues strong, and prices are firmer. The leading producer is still quoting No. 28 black sheets at 2.75c., and galvanized sheets at 75 and 10 per cent off.

Ferro-manganese.—Domestic 80 per cent is still quoted at $50, but the foreign product is held at $51.50@$52.

Cartagena, Spain. Feb. 14.

(Special Report of Barrington & Holt.)

Iron and Manganiferous Ores.—Shipments for the week were two cargoes, 6,450 tons, dry ore and one cargo, 3,500 tons campanile ore, all to Great Britain. This makes a total of 68,630 tons to date. There has been very little activity in the shipments from Cartagena, although there is quite a little boom in the local buying at the mines, which are especially busy in the Portman District. This is due to the arrival of one or two new shippers who are competing to buy ore at the open mines, needless to say, much to the satisfaction of the small miners. One or two new contracts are reported for forward delivery and inquiries for delivery over the rest of the year are various, for dry ore, magnetic and colorados. Freight rates are not quite as favorable as they were last week, 3d. to 6d. per ton more being asked.

Prices are firm at 6s. 9d.@7s. per ton, f. o. b. shipping port, for ordinary 50 per cent ore; 7s. 3d.@7s. 9d. for special low phosphorus; 9s. 3d. for 58 per cent specular ore. Magnetic ore, 60 per cent iron, is 11s. for lump and 9s., 6d. for smalls. Manganiferous ores range from 14s. 6d. for 20 per cent manganese and 20 iron, to 9s. 9d. for 12 manganese and 35 iron.

Pyrites.—Iron pyrites, 43 per cent sulphur and 40 per cent iron, are quoted at 11s. 3d. per ton. No shipments are reported for the week.

CHEMICALS AND MINERALS.

(See also prices-current on page 396.)

New York, March 4.

The month opens with a freer movement of manufactured products, and a hardening tendency in prices. Raw materials continue high, and ocean freights are firmer.

The result of an international combination in the chemical industry is shown by the report of the Borax Consolidated, Limited, which was formed early in 1899, to obtain control of borax and boric acid works in California, at Bayonne, N. J., and elsewhere. The earnings are larger than at first anticipated, and in 1902 yielded dividends of 17½ per cent ($52,500) on the ordinary shares, and 5½ per cent ($220,000) on the preferred. The total capital is £1,400,000 ($7,000,000).

Heavy Chemicals.—Shipments are more satisfactory, and prices are steady, as below, per 100 lbs.:

	Domestic, F. o. b. works.		Foreign, F. o. b. New York.	
	Prompt.	Futures.	Prompt.	Futures.
Alkali, high-test in bags	82½@85c.	72½@75c.	90@92½c.	.....
Caustic soda, high-test in bags	$1.90@$1.95	$1.65@$1.70	$1.90@$2.00	.....
Bicarb. soda, ordinary	$1.25	.....	$1.50@$1.60	.....
Bicarb. soda, extra	$3.00	.....	.....	.....
Sal soda	55c.	.....	67½c.	.....
Chlorate of potash	$7¼@$7½	$7@$7¼	$7½@$8	$7@$7¼
Bleaching powder, per quality	.....	$1@$1.20	$1.37½@$1.75	$1.20@$1.25

Imports of heavy chemicals into the United States in January were as follows, in pounds:

	1902.	1903.	Changes.
Bleaching powder	12,160,460	7,623,733	D. 4,536,727
Chlorate of potash	100,684	44,459	D. 56,225
Caustic soda	281,069	240,341	D. 40,728
Sal soda	317,400	411,663	I. 94,263
Soda ash	3,095,512	2,096,867	D. 998,645

Notable decreases this year were 37.3 per cent in bleaching powder, and 32.3 per cent in soda ash. These two articles are being produced on an increased scale in the United States.

There were re-exported this year 5,605 lbs. chlorate of potash, as against nothing in January, 1902, and 135,875 lbs. caustic soda, against 102,610 lbs. last year.

Cyanide of Potassium.—Imports are at the rate of over 3,000,000 lbs. annually, or fully 1,000,000 lbs. more than the domestic production. Small quantities are exported, chiefly to Mexico and South America. The present import price is less than last year, and large orders can no doubt be placed around 20c. per lb., f. o. b. New York.

Acids.—Contract deliveries are regular. Blue vitriol has been strengthened by the advance in copper.

Exports of copper sulphate from the United States in January compare with those reported by Great Britain as follows, in long tons:

	1902.	1903.	Changes.
United States	1,384	939	D. 445
Great Britain	1,088	3,446	I. 2,358
Difference, U. S.	I.306	D.2,507	.....

The average invoice value of these exports compares as follows, per ton:

	1902.	1903.	Changes.
United States	$82.62	$86.89	I. $4.27
Great Britain	100.71	88.47	D. 12.24
Decrease, U. S.	$18.09	$1.58	.....

The falling off in the exports from the United States this year has been due chiefly to the absence of demand from Greece and other countries; also to the fact that Great Britain has been a keen competitor. The rise in American values has been initiated by smaller stocks in makers' hands and also by the upward tendency of the copper market. It is noteworthy that the difference between the British and American values is narrowing gradually. Heretofore the higher value quoted by Great Britain was warranted by the better grade of copper sulphate exported, but in recent years the American product has improved and is desired by many consumers.

Quotations per 100 lbs. are as below, unless otherwise specified, for large lots in carboys or bulk (in tank cars) delivered in New York and vicinity:

Blue Vitriol	$5.25@$5.37½	Oxalic com'l	$5.25@$5.50
Muriatic, 18°	1.50	Sulphuric, 50°,	
Muriatic, 20°	1.60	bulk, ton	13.50@14.50
Muriatic, 22°	1.75	Sulphuric, 60°	1.05
Nitric, 36°	4.37½	Sulphuric, 60°,	
Nitric, 38°	4.75	bulk, ton	18.00@20.00
Nitric, 40°	5.00	Sulphuric, 66°	1.20
Nitric, 42°	5.37½	bulk, ton	21.00@23.00

Brimstone.—Trade is quiet. Spot, best unmixed seconds are nominal at $23 per ton, while shipments are quoted at $22.25@$22.50, according to position. Best thirds are about $1.25 less. Ocean freight rates from Sicily to Atlantic ports are about 8s. 3d. ($1.98). Reports that Americans have purchased the Popocatapetl volcano in Mexico from Gen. Gasper Ochoa, the owner, recalls the fact that the Virginia-Carolina Chemical Company—the Southern fertilizer combination—already owns considerable sulphur property in that country. The purchasers of the immense sulphur deposits in the crater of the Popocatapetl will build a cogwheel railway up the mountain to facilitate operations on a large scale. As yet no estimate has been given of the quantity of sulphur "in sight," but it is believed to be very large. It is significant that the price said to have been paid—$5,000,000—is little short of the total capitalization of the Sicilian brimstone combination which supplies the world.

Imports of brimstone into the United States in January were 25,927 long tons, as against 8,806 tons last year; showing an increase of 17,121 tons, which is credited to the sulphite pulp mills. There were 201 tons re-exported, which compares with 290 tons last year, this trade being chiefly with Central and South America.

Imports of brimstone into Great Britain in January were 1,798 long tons, against 2,089 tons last year; showing a decrease of 291 tons. The total exports from Sicily to Great Britain in 1902 amounted to 25,477 long tons, as compared with 22,403 tons in 1901; showing an increase of 3,074 tons, or 13.7 per cent. This brimstone has been chiefly refined by the Chance process.

Sicilian Brimstone Market.—Messrs. Emil Fog & Sons, of Messina, write us under date of January 31, as follows: Statistics at end of December are now to hand, and afford opportunity of judging the position. We observe that exports remain stationary, or have increased slightly, except to Italy and France. Italy shows quite a considerable diminution. Consumption in Italy in 1900 was 101,000 tons; in 1902 only 45,000 tons. The direct cause is the filoxera, which is still doing great devastation in the vineyards, and 3 to 5 years will be required to restore them entirely. France imported in 1900 103,000 tons, in 1901 75,000 tons, and in 1902 67,000 tons. This decrease is partly accounted for by the fact that since the establishment of refineries in that country Algiers and other colonies are now buying direct from Sicily instead of from Marseilles, as formerly. Exports to United States have increased by 25,000 tons. Prospects for the future are encouraging. The great danger which menaces Sicilian brimstone is that the pulp manufacturers may turn to the much cheaper pyrites. Owing to the inflated prices for brimstone great efforts are being made to increase the production, but so far without much success. The increase in the total output in 1902 was only 30,000 tons. Some mines suffered from inundation and others are nearly exhausted. The Sicilian sulphur mines are not deep, very few reach a depth of 150 to 200 meters. Prospecting for deeper deposits are actively pursued, and on the result will depend the future. Prices remain stationary. Thirds are maintained. Current thirds are almost on par with best thirds, and therefore offer no convenience any more. Freights are lower. New York, 7s. 3d.; Boston, 7s. 6d.; Philadelphia, 8s.; Portland and Baltimore, whole steamers, 7s. 6d.; Canadian ports, spring shipment, 8s. 6d.; Baltic ports, 9s.@10s. Sailers to Australian ports, 16s. 6d.; Port Elizabeth or Durban, 16s. We quote sulphur as follows, per ton, f. o. b.: Best unmixed seconds, in bulk, 83s.; best thirds, in bulk, 78s. 9d.; current thirds, in bulk, 79s.; refined block sulphur, in bulk, 87s.; refined roll sulphur, in 3-cwt. casks, 97s. 9d.; sublimed flowers, pure, in bags, 103s. 6d.; sublimed flowers, current, in bags, 98s.; refined roll sulphur, in cases of 50 kilos, in sticks of usual size, 103s.; in sticks of small size, 104s. 6d.

Mr. Solon J. Vlasto, a leading importer of New York, in reviewing the Sicilian sulphur industry last year, says that the exports to the United States, amounting to 168,919 long tons, were the largest in the history of the trade. Most of this brimstone has been consumed by the paper trade. Stocks in Sicily on January 1, 1903, were nearly 340,000 tons at seaboard, while 150,000 tons were at interior points or in transit; making the total stocks nearly 500,000 tons. This enormous stock is held mostly by the Anglo-Sicilian Sulphur Company, the independent miners having less than one-sixth of the whole quantity.

Pyrites.—Importers report firmer ocean freight rates. The present quotation is 11s. 3d. ($2.70) from Huelva, Spain, to Atlantic ports.

Quotations for pyrites are f. o. b. Mineral City, Va.: Lump ore, $5 per ton, and fines 10c. per unit; Charlemont, Mass., lump, $5, and fines, $4.75. Spanish pyrites, lump, 12@13c.; fines, 10@11c. per unit, delivered at New York and other Atlantic ports. Spanish pyrites contain from 46 to 52 per cent of sulphur; American, from 42 to 44 per cent.

Imports of pyrites into the United States in January were as follows in long tons, the sulphur content being approximate:

	1902.	1903.	Changes.
Pyrites imports	38,113	29,614	D. 8,499
Sulphur content	17,913	13,919	D. 3,994

These pyrites have come chiefly from Spain. Taking the average invoice value of the pyrites at $3.66 per ton, the cost of the sulphur contained therein is $7.78 per ton. This is $1.42 more than last year, but it is also considerably less than the cost of best third brimstone, which is consumed chiefly in the manufacture of sulphuric acid for fertilizer purposes. All the imports in January were of iron pyrites, averaging about 40 per cent metal, which can be sold at a profit.

Imports of pyrites into Great Britain in January were as follows, comparison being made with the same month last year, in long tons:

	1902.	1903.	Changes.
Pyrites	63,066	70,089	I. 7,023
Sulphur content	29,641	32,942	I. 3,301

The increase is noteworthy, as imports of brimstone show a falling off. The average invoice import value of pyrites was $7.94 per ton, as against $8.22 in January, 1902; showing a reduction of 28c. The sulphur contents was valued at $16.89 per ton this year, and $17.50 in 1902; showing a fall of 61c., which compares with an advance of 29c. per ton in the import value of Sicilian brimstone.

Nitrate of Soda.—Excitement in the trade has been caused by the loss of the steamship *Coya's* cargo of 29,000 bags off St. Kitt's, in the British West Indies. Spot nitrate of soda has advanced to $2.20 per 100 lbs., while futures are also stronger at $1.85 @$1.95, according to position. In fact, the whole situation has been strengthened, as the fertilizer buying season is on. In Europe there is also an improvement, as the consumption in February was heavy. Consequently the Chilean market shows a hardening tendency. Ocean freight rates are also better, and 13s. 3d. ($3.18) appears to be the lowest now obtainable.

Imports of nitrate of soda into the United States in January amounted to 17,089 long tons, which, compared with the same month last year, shows an increase of 944 tons.

Chilean Nitrate of Soda Market.—Messrs. Jackson Brothers, of Valparaiso, write us under date of January 24, as follows: The business done during the fortnight has been entirely confined to near deliveries, and with a gradual reduction in prices from 6s. 6½d. to 6s. 5d. alongside for February, and 6s. 5½d. to 6s. 4½ d. for March, a large portion of the transactions was made up of resales. For forward deliveries no interest whatsoever has been shown. The total production during 1902 was 29,800,000 qtls., against 28,370,000 qtls. in 1901, and the consumption of the world, 28,400,000 qtls., in 1902, as compared with 31,300,000 qtls. in 1901. We quote February, 6s. 5d.; March, 6s. 4d.; April, 6s. 3½d., all ordinary terms sellers, while the refined quality is offered at 6s. 8d. for February—March delivery. The price of 6s. 5d. per qtl., with an all-round freight of 12s. 6d. per ton, stands in 7s. 9¼d. per cwt., net cost and freight, without purchasing commission. Reported sales are 410,900 qtls., and resales, 209,000 qtls.

Sulphate of Ammonia.—Sales of good gas liquor are being made at $3.10@$3.12½ per 100 lbs., according to time of delivery.

Phosphates.—Trade is quieter, and ocean freights firmer. Charters are being booked from Tampa, Fla., to German ports on basis of 15s. ($3.60).

Unfavorable weather has interfered with mining in most fields, but considering the larger capacity of many plants and the erection of new ones, it does not look as though this year's production will fall below 1902. In fact, there is every indication that we shall see an increase. Florida reports that the Land Pebble Phosphate Company's property, near Bartow, has been purchased by Joseph Hull, a large miner, who will operate the plant on an extensive scale. The Camp Phosphate Company is erecting several dredges near Istachatta to mine rock along the banks of the Withlacoochee River. New Plants are being built by J. Buttgenbach & Co., in the Dunnellon District, and the Albion Chemical and Mining Company, near Albion. Tennessee mining is hampered by wet weather. If reports are true a company is to be formed to purchase and develop the Hickman County field, which is on the Centerville branch of the Nashville, Chattanooga & St. Louis Railroad. The shipments from this field have been about 2,000 tons a month of blue rock, a rather low grade phosphate. In South Carolina the industry shows seasonably good business. The Charleston Mining and Manufacturing Company, controlled by the Virginia-Carolina Chemical Company, has just met the $250,000 mortgage held by the Girard Trust Company, of Philadelphia. This is the mortgage that was taken in February, 1901, on the franchises and property in South Carolina, when the stockholders authorized the issue of $1,000,000 bonds.

The foreign phosphate trade of the United States in January was as below, in long tons:

	1902.	1903.	Changes.
Exports (domestic)	34,910	15,315	D. 19,595
Imports	14,529	24,352	I. 9,823

It is noteworthy that while exports have fallen off 56 per cent, owing principally to the smaller demand from Great Britain, our imports from Belgium and other countries have increased 69 per cent.

Imports of phosphates into Great Britain in January were 42,978 long tons, against 28,284 tons last year, showing an increase of 14,694 tons, or 52 per cent. These phosphates have come principally from Belgium.

Abroad much attention is being paid to the development of the African deposits. In Tunis the Gafsa Phosphate Company will increase its output this year to 300,000 or 310,000 tons, which compares with 262,000 tons in 1902, and 178,000 tons in 1901. In 1902 the company did a satisfactory business, as the lower freight rates and large production compensated for the lower prices for phosphates. In Norway the apatite mines are now controlled by the Franco-Norwegian Apatite Mining Company. Norway apatite is a high-grade phosphate, which sells at considerably more than American or African, but the production is small, being less than 2,000 tons a year. Good phosphate deposits are reported to have been discovered in Japan, in Shima Province. Guano deposits have been worked on Tori Shima Island, but a violent volcanic eruption last August destroyed the workings and killed the inhabitants.

Phosphates	Per ton F. o. b.	United Kingdom or European Ports. Unit.	Long ton.
*Fla. hard rock (78@80%)	$6.00@$6.50	6@6⅜d.	$9.48@10.07
*Fla. land peb. (68@73%)	3.00@ 3.25	4⅝@5d.	6.65@ 7.00
†Tenn., (78@82%) export	3.75@ 4.00	5½@6d.	8.58@ 9.36
†Tenn., 78% domestic	3.25@ 3.50	.....	.....
†Tenn., 75% domestic	3.00@ 3.25	.....	.....
†Tenn., 73@74% domestic	2.50@ 2.75	.....	.....
†Tenn., 70@72% domestic	2.25@ 2.50	.....	.....
‡So. Car. land rock	..@ 3.25	4½@4¾d.	5.67@ 5.98
‡So. Car. river rock	2.75@ 3.00	.....	.....
Algerian (63@68%)	.....	4½@4¾d.	5.85@6.18
Algerian (58@63%)	.....	4¼@4½d.	5.10@5.40
Algerian (53@58%)	.....	4⅛@4⅝d.	4.62@4.90

* Fernandina, Brunswick or Savannah.
† Mt. Pleasant. ‡ On vessels, Ashley River.

Liverpool. Feb. 18.

(Special Report of Joseph P. Brunner & Co.)

There has been a pause in the demand for sulphate of copper, with the result that some small lots have been offering at reduced figures. Prices, however, are inclined to stiffen again in sympathy with the strong position of the copper market, and at the close £22 10s. per ton, less 5 per cent, is about nearest value for sulphate for prompt delivery. The offerings by second-hands are small, while buyers seem to have pretty well filled up their requirements for the season.

Exports of bleaching powder and sodas for the month of January, as per Board of Trade returns, are as follows: Bleaching powder to United States, 62,233 cwts.; other countries, 35,123; total, 97,356 cwts. Soda ash, 132,950 cwts.; caustic soda, 104,849; bicarbonate soda, 25,050; crystals, 14,754; sulphate, 61,758; other sorts, 29,706; total, 369,067 cwts.

Contrary to general expectations the total shipments of bleaching powder show a slight falling off as compared with January last year, being accounted for by the much smaller shipments to the United States. The quantities shipped to other countries are considerably in excess of the exports for January, 1902. As regards sodas, the shipments are very heavy as compared with January, 1902, more especially of soda ash and saltcake.

Soda Ash.—Unchanged. For tierces, the nearest quotations are about as follows: Leblanc ash, 48 per cent, £5 15s.@£6; 58 per cent, £6 2s. 6d.@£6 7s. 6d. per ton, net cash. Ammonia ash, 48 per cent, £4 5s. @£4 10s.; 58 per cent, £4 10s.@£4 15s. per ton, net cash. Bags, 5s. per ton under price for tierces.

Bleaching Powder.—Little fresh business is reported. For hardwood, quotations are nominally about £4 7s. 6d.@£4 10s. per ton, net cash, with special prices for several export markets.

Chlorate of Potash.—Firmer at 2⅞@3d. per lb., net cash. Makers report sales at the higher figure.

Sulphate of Ammonia.—A shade easier at £12 13s. 9d.@£12 16s. 3d. per ton, less 2½ per cent for good gray 24@25 per cent in double bags, f. o. b. here.

Nitrate of Soda.—Steady on spot at £9 7s. 6d.@ £9 10s. per ton, less 2½ per cent for double bags, f. o. b. here, as to quality, and a moderate trade reported.

METAL MARKET.

New York, March 5.

Gold and Silver Exports and Imports.

At all United States Ports in January and Year.

Metal	January. 1902.	January. 1903.	Year. 1902.	Year. 1903.
Gold:				
Exports	$1,973,675	$77,143	$1,973,675	$77,143
Imports	1,405,787	1,787,847	1,405,787	1,787,847
Excess.	E. $567,888	I. $1,710,704	E. $567,888	I. $1,710,704
Silver:				
Exports	$4,524,010	$3,577,416	$4,524,010	$3,577,416
Imports	2,107,681	1,893,963	2,107,681	1,893,963
Excess.	E. $2,416,329	E $1,683,453	E. $2,416,329	E. $1,683,345

These figures include the exports and imports at all United States ports, and are furnished by the Bureau of Statistics of the Treasury Department.

Gold and Silver Exports and Imports, New York.

For the week ending March 4, and for years from January 1:

Period.	Gold. Exports.	Gold. Imports.	Silver. Exports.	Silver. Imports.	Total Excess, Exports or Imports.
Week	$17.000	$242.883	$517,316	$2,524	E. $288,809
1903	757,933	1,137,408	3,607,978	144,731	E. 3,083,772
1902	8,799,424	511,107	7,941,090	234,100	E. 15,995,907
1901	9,028,520	614,753	7,020,420	710,439	E. 14,723,748

Financial Notes of the Week.

Business continues generally unchanged. No more gold has been taken for South America since the shipment of $750,000 to Buenos Aires, recently noted.

The statement of the New York banks, including the 59 banks represented in the Clearing House, for the week ending February 28, gives the following totals, comparisons being made with the corresponding weeks of 1902 and 1901:

	1901.	1902.	1903.
Loans and discounts	$914,200,400	$938,191,200	$950,156,300
Deposits	1,012,514,000	1,017,488,300	956,206,400
Circulation	31,309,400	31,308,700	43,279,100
Specie	193,948,500	192,433,300	176,700,400
Legal tenders	73,981,100	71,914,600	68,303,100
Total reserve	$267,929,600	$264,348,100	$245,003,500
Legal requirements	253,128,500	254,372,075	239,051,600
Balance surplus	$14,801,100	$9,975,925	$5,951,900

Changes for the week, this year, were an increase of $87,300 in circulation, and decreases of $52,400 in loans and discounts, $7,012,900 in deposits, $4,071,600 in specie, $771,400 in legal tenders, and $3,089,775 in surplus reserve.

The following table shows the specie holdings of the leading banks of the world at the latest dates covered by their reports. The amounts are reduced to dollars and comparison made with the holdings on the corresponding date last year:

	1902. Gold.	1902. Silver.	1903. Gold.	1903. Silver.
N. Y. Ass'd	$192,433,500	.....	$176,700,400	.....
England	189,261,415	.....	180,227,480	.....
France	500,770,465	$220,883,940	506,697,090	$219,226,750
Germany	197,255,000	72,975,000	176,612,000	65,322,500
Spain	70,235,000	87,815,000	72,115,000	99,850,000
Neth'l'ds	28,658,000	32,656,000	23,495,000	33,059,500
Belgium	15,683,335	7,841,665	16,116,665	8,058,335
Italy	79,595,000	10,612,000	86,545,000	10,892,000
Russia	355,470,000	35,515,000	384,975,000	37,715,000

The returns of the Associated Banks of New York are of date February 28 and the others February 26, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

The silver market has had a rise in London this week, based on good Indian demand and some speculative buying. The tendency seems to be toward higher prices due to the feeling that the Philippine Coinage Bill, just passed by Congress, will create a new demand for silver.

The United States Assay Office in New York reports receipts of 26,000 oz. silver for the week.

Shipments of silver from London to the East for the year up to February 19 are reported by Messrs. Pixley & Abell's circular, as follows:

	1902.	1903.	Changes.
India	£1,252,320	£1,148,300	D. £104,020
China	11,500	101,500	I. 90,000
The Straits	.....	58,508	I. 58,508
Total	£1,263,820	£1,308,308	I. £44,488

Receipts for the week, this year, were £301,000 in bar silver from New York, and £14,000 from Australia; total, £315,000. Shipments were £124,000 in bar silver to Bombay, £37,500 to Calcutta, and £10,000 to China; total, £171,500.

Indian exchange continues strong, and all the Council bills offered in London were taken at an average of 16.06d. per rupee. There is a little more demand for silver on Indian account.

The coinage executed at the mints of the United States in February and the 2 months of this year, is reported by the Bureau of the Mint as follows:

Denominations.	February. Pieces.	February. Value.	Jan. Feb. Value.
Double eagles	85,890	$1,717,800	$5,337,800
Eagles	195,071	1,950,710	1,950,710
Half-eagles	764,000	3,820,000	7,660,000
Dollars for La. Exp.	.....	.....	175,178
Total, gold	1,044,961	$7,488,510	$15,123,688
Dollars	1,350,000	1,350,000	2,850,000
Half dollars	218,000	109,000	228,000
Quar.-dollars	248,000	62,000	67,000
Dimes	.....	.....	83,000
Total, silver	1,816,000	$1,521,000	$3,228,000
Five c. nickels	2,734,000	136,700	270,800
One c. bronze	5,067,000	50,670	137,480
Total minor	7,801,000	$187,370	$408,280
Total coinage	10,661,961	$9,196,880	$18,759,968
Coinage, 1902	11,496,540	9,261,340	20,019,887

The decrease of $1,259,919 in the two months' coinage this year was in silver, gold and minor coins showing an increase.

The foreign merchandise trade of France in January is reported by the Ministry of Commerce as follows:

	1902.	1903.
Imports	Fr. 328,968,000	Fr. 355,309,000
Exports	295,662,000	329,650,000
Excess, imports	Fr. 33,306,000	Fr. 25,659,000

The increase in imports was 26,341,000 fr., while that in exports was 33,988,000 fr.; leaving decrease of 7,647,000 fr. in excess of imports.

Prices of Foreign Coins.

	Bid.	Asked
Mexican dollars	$.38	$.39¾
Peruvian soles and Chilean pesos	.37	.39
Victoria sovereigns	4.86	4.88
Twenty francs	3.86	3.88
Twenty marks	4.74	4.80
Spanish 25 pesetas	4.78	4.82

OTHER METALS.

Daily Prices of Metals in New York.

Feb.–Mar.	Sterling Exchange	Silver N. Y. Cts.	Copper London, Spot.	Copper Lake, Cts. per lb.	Copper Electrolytic, Cts. per lb.	Copper London, £ per ton	Tin, Cts. per	Lead Cts. per lb.	Spelter N. Y. Cts. per lb.	Spelter S. L. Cts. per lb.
26	4.87⅜	48½	22⅜	13½ @13¾	14 @13¾	59¼	29¾	4.05 @4.10	5 05	4.87½
27	4.87⅜	48	22⅛	13¾ @13¾	13 @13½	59	29⅞	4.05 @4.10	5.07½	4.90
28	4.87⅜	48	22⅛	13¾ @13¾	13¾ @13⅜	....	30¼	4.05 @4.10	5.07½	4.90
2	4.87½	48	22⅛	13⅜ @13⅝	13¾ @13½	59½	30½	4.05 @4.10	5.07½	4.90
3	4.87	48¼	22¼	13½ @13⅝	13⅜ @13⅜	59¾	30¾	4.05 @4.10	5.07½	4.90
4	4.87	48⅜	22⅛	13⅝ @13¾	13½ @13⅜	59¾	30⅝	4.05 @4.10	5.07½	4.90

London quotations are per Long Ton (2,240 lbs.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars; the price of electrolytic cathodes is usually 0.25c lower than these figures.

Copper.—The market remains extremely strong. It seems that the upward movement, which started about two months ago, has not as yet culminated, and a further advance is freely predicted. Consumption both here and abroad certainly leaves nothing to be desired, while, on the other hand, the higher values established have so far not stimulated pro-

duction to any appreciable extent. In spite of the comparatively small exports reported for the month of February, available supplies of refined copper are at low ebb, and the metal is beginning to get scarce for early delivery, especially as far as conductivity copper is concerned, the demand for this description being very brisk indeed. At the close, we quote Lake copper at 13⅝@13¾c.; electrolytic in ingots, cakes and wirebars, at 13½@13⅝c.; in cathodes, at 13¼@13⅜c.; casting copper, at 13⅜@13½c.

The market for standard copper in London, which closed last week at £59, opened on Monday at £59 12s. 6d., and the closing quotations on Wednesday are cabled as £59 12s. 6d.@£59 15s. for spot; £60@£60 2s. 6d. for three months.

Statistics for the second half of February show a decrease in the visible supplies of 100 tons.

Refined and manufactured sorts we quote: English tough, £62 10s.@£63; best selected, £65 5s.@£65 10s.; strong sheets, £73@£73 10s.; India sheets, £70 10s.@£71 10s.; yellow metal, 6¼@6⅜d.

Exports of copper from Atlantic ports in the week ending March 3, are reported by our special correspondents as follows: Great Britain, 485 long tons; Germany, 203; France, 1,849; Austria, 95; Holland, 1,085; Sweden, 40; Russia, 100; Australia, 14; Argentina, 31; total, 3,902 tons. Imports were 725 tons copper from Mexico.

Imports of copper in all forms into the United States in January, with re-exports of foreign copper, are reported by the Bureau of Statistics as below, in long tons of 2,240 lbs.:

Fine copper:	1902.	1903.	Changes.
Imports	1,859	4,316	I. 2,457
Re-exports	984	13	D. 971
Net imports	875	4,303	I. 3,428
Ores and matte:			
Imports	4,188	21,636	I. 17,448
Re-exports	2,730	95	D. 2,635
Net imports	1,458	21,541	I. 20,083

The report does not separate ores and matte, so that the copper contents cannot be exactly given. A close estimate puts the total net imports this year at 6,335 tons fine copper in January, against 5,074 tons last year. Of the ores and matte imported this year, the greater part—20,757 tons—came from Canada; of the fine copper 3,549 tons were from Mexico and 533 tons from Great Britain.

Exports of domestic copper in January are reported by the Bureau of Statistics as follows, in long tons:

	1902.	1903.	Changes.
Fine copper	14,324	10,961	D. 3,363
Ore and matte	3,513	783	D. 2,730

Again estimating the ores and matte, we find the total fine copper exported approximately 11,177 tons this year, against 16,028 tons in 1902; a decrease of 4,851 tons.

Chilean Copper Market.—Messrs. Jackson Brothers write from Valparaiso, Chile, under date of January 24, that recent sale sof bar copper amounted to 12,705 quintals; current quotations being $32.40, Chilean currency, per quintal. Sales of regulus were 250 tons, at an average of $30.28, Chilean currency, per metric quintal, on a basis of 50 per cent copper. No sales of ore were reported; quotations nominal at $3.96, currency, per metric quintal, on basis of 10 per cent copper.

Tin.—This metal has again made good its reputation of being the most erratic article on the list, and the London speculators treated the trade to a grand display of fireworks. While it is conceded that the statistical position of tin is a very good one, mostly due to the large consumption in the United States, the immediate cause of the upward movement was the decrease of 1,700 tons in the visible supplies for the month of February. This fact, together with the report that further 300 tons were taken from stock on Monday, was sufficient to advance prices abroad nearly £5 within a few days. Our market quickly responded, and while spot tin was obtainable the end of last week at about 29¾c., on Tuesday 30⅝@30¾c. was freely paid, although consumers felt somewhat reluctant to engage themselves heavily at the higher values established. The closing quotations on Wednesday are given as 30½@30⅝c. for spot, 30⅝@30¾c. for futures.

The London market, which closed last week at £134 10s., opened on Monday at £136 10s., advanced on Tuesday to £139, and the closing quotations on Wednesday are cabled as £138 2s. 6d.@£138 5s. for spot, £138 17s. 6d.@£139 for three months.

Imports of tin into the United States in January are reported as follows, in long tons of 2,240 lbs.:

	1902.	1903.	Changes.
Straits	2,382	545	D. 1,837
Australia	....	10	I. 10
Great Britain	1,045	1,958	I. 913
Holland	35	16	D. 19
Other countries	31	25	D. 6
Total	3,493	2,554	D. 939

The total shows a decrease for the first time in several months. This decrease was entirely in Straits tin.

Visible supplies of tin on March 1 are reported as below, in long tons:

	Store.	Afloat.	Total.
London	3,848	2,623	6,471
Holland	998	498	1,496
U. S., exc. Pacific ports	3,842	4,485	8,327
Total	8,688	7,606	16,294

Lead has been in very good demand in the East as well as in the West, business in all branches being very brisk indeed. The ruling quotations are 3.97½@4c., St. Louis; 4.05@4.10c., New York.

In Europe, the buoyant tendency which has ruled for some time past continues, and our cables report a further advance, Spanish lead being quoted at £12 12s. 6d.@£12 13s. 9d.; English lead, £12 15s.@£12 16s. 3d.

Imports of lead into the United States in January, with re-exports of foreign lead, are reported by the Bureau of Statistics of the Treasury Department as below, in short tons:

	1902.	1903.	Changes.
Lead, metallic	631	34	D. 597
Lead in ores and base bullion	10,053	7,399	D. 2,654
Total imports	10,684	7,433	D. 3,251
Re-exports	7,697	4,378	D. 3,319
Balance	2,987	3,055	I. 68

Of the imports this year 6,322 tons, or 85.1 per cent, were from Mexico, and 713 tons, or 9.6 per cent, from Canada. In addition to the re-exports given above, there were 25 tons of domestic lead exported this year.

St. Louis Lead Market.—The John Wahl Commission Company telegraphs us as follows: Lead is strong and fairly active. The supply of Missouri lead seems to be limited, and in consequence has advanced to 4c., same as desilverized.

Spanish Lead Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of February 14, that the price of silver for the week has been 11.50 reales per ounce. Exchange has gone up by 7 centimos, making it 33.57 pesetas to £1. The local quotation for pig lead on wharf has been 61.25 reales per quintal, which on above exchange is equal to £10 3s. 11d. per ton of 2,240 lbs., f. o. b. Cartagena. Exports of pig lead have been 304,800 kgs. to Liverpool; 100,000 kgs. to Marseilles; a total of 404,800 kgs. Other exports were 720 kgs. silver bars to Marseilles.

Spelter.—There has been a very large consumptive demand, especially for galvanizing purposes, throughout the week, and we understand that heavy quantities have changed hands at full prices. Quotations have again stiffened, and at the close we quote 4.90c., St. Louis; 5.07½c., New York.

The foreign market also displayed considerable strength, good ordinaries being quoted at £21 12s. 6d.@£21 15s.; special, £21 15s.@£21 17s. 6d.

Exports of spelter from the United States in January were 279 short tons, against 410 tons in January, 1902; a decrease of 131 tons, or 31.9 per cent. Exports of zinc ores were 6,497 tons, against 2,645 tons last year; an increase of 3,852 tons.

St. Louis Spelter Market.—The John Wahl Commission Company telegraphs us as follows: Spelter is slowly advancing. Latest sales are on a basis of 4.92½c.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of February 14, that the boom in zinc-blende ores continues, and prices are firm. Shipments for the week were 1,900 kgs. blende to Antwerp.

Antimony has been very dull and depressed throughout the week, all orders being eagerly competed for. We quote Cookson's at 8¼c.; Hallett's at 6⅞@7c.; Italian, United States, French, Hungarian and Japanese at 6½@6⅝c.

Imports of antimony into the United States in January were as follows, in pounds:

	1902.	1903.	Changes.
Metal and regulus	249,743	397,879	I. 148,154
Antimony ore	138,263	112,000	D. 26,263

There was a large increase in metal, but a falling off in ore imported.

Nickel.—The price is now quoted by leading producers at 40@47c. per lb. for large quantities down to ton lots, according to size and terms of order. The price for smaller lots, according to quality, runs as high as 60c. per lb.

Exports of nickel, nickel oxide and nickel matte from the United States in January were 231,178 lbs., against 397,283 lbs. in January, 1902; a decrease of 166,105 lbs., or 41.8 per cent.

Platinum.—Consumption continues good, and prices are firm. Ingot platinum in large lots brings $19 per oz. in New York.

Chemical ware (crucibles and ishes), best hammered metal from store in large quantities, is worth 72½c. per gram.

Imports of platinum into the United States in January were 609 lbs., against 451 lbs. in January, 1902; an increase of 158 lbs., or 35 per cent.

Quicksilver.—The New York price is $47 per flask for large lots, with a slightly higher figure quoted for small orders. The San Francisco quotation is $45.50@$46.50 per flask for domestic orders, and $43@$43.50 for export. The London price is £8 12s. 6d. per flask, with the same quotation from second hands.

Exports of quicksilver from all United States ports in January were 12,847 lbs., against 54,205 lbs. in January, 1902; a decrease of 41,358 lbs., or 76.6 per cent.

Minor Metals and Alloys.—Wholesale prices, f. o .b. works, are as follows:

Aluminum.	Per lb.
No. 1, 99% ingots	33@37c.
No. 2, 90% ingots	31@34c.
Rolled Sheets	4c. up
Alum-bronze	20@23c.
Nickel-alum	33@39c.
Bismuth	$1.50
Chromium, pure (N.Y.)	80c.
Copper, red oxide	50c.
Ferro-Molyb'um (50%)	$1.25
Ferro-Titanium (10%)	90c.
Ferro-Titanium (20@25%. N. Y.)	55c.

	Per lb.
Ferro-Tungsten (37%)	28c.
Magnesium	$2.75
Manganese, pure (N.Y.)	60c.
Mangan'e Cop. (20% Mn)	32c.
Mangan'e Cop. (30% Mn)	38c.
Molybdenum (Best)	$1.82
Phosphorus	45c.
American	70c.
Sodium metal	50c.
Tungsten (Best)	62c.

Missouri Zinc Ore Market. Feb. 28.

(From Our Special Correspondent.)

Zinc ore prices have advanced in many instances, quotations ranging from 50c. to $1.50 per ton above the previous week, while the assay basis price was generally advanced to $33, and in a few cases to $34 per ton for ore assaying 60 per cent zinc. The highest price reported paid is $36 per ton. The feature of the market was that no advances were made on the higher grades of ore, the greater demand being for ore ranging from 60 per cent to 62 per cent zinc. Lead is still $51 per ton, delivered, a price that leaves the smelters a margin of only $5 per ton smelting charges, or $2 per ton less than is customarily demanded. The price is due to competition among the smelters in Joplin, Granby, Galena and Carterville. A year ago the highest price paid for zinc was $31.50 per ton and for lead $43.50 per ton.

The total sales for the two months are 6,616 tons of zinc and 633 tons of lead, less than the same period of last year, yet the value is only $24,586 less. During the 2 months of this year zinc has averaged $30.80 and lead $51 per ton against $27 for zinc and $42.80 for lead last year.

Following are the shipments from the various camps for the week ending February 28:

	Zinc lbs.	Lead lbs.	Total. Value.
Joplin	3,094,660	339,490	$59,699
Webb City, Carterville	2,025,900	396,970	43,336
Duenweg	1,498,570	101,860	25,334
Galena, Empire	893,930	92,140	15,726
Oronogo	516,960	29,590	9,334
Carthage	439,390	.....	7,250
Aurora	570,520	.....	7,160
Alba, Neck	355,540	.....	5,067
Zincite	262,180	1,760	4,243
Prosperity	211,400	2,120	3,546
Granby	211,000	25,000	2,960
Cave Spring	106,460	11,940	2,060
Carl Junction	101,670	.....	1,728
Spurgeon	110,590	14,190	1,461
Badger	35,440	.....	585
Central City	37,870	.....	530
Gillham, Ark.	40,530	.....	527
Peoria, I. T.	.....	14,770	442
District total	10,512,630	1,029,830	$190,988
Total two months	77,077,770	9,150,890	$1,422,487

Zinc value, week $161,603, 9 weeks, $1,187,173. Lead value, week $29,385, nine weeks, $235,314.

Average Prices of Metals per lb., New York.

Month.	Tin. 1903.	Tin. 1902.	Lead. 1903.	Lead. 1902.	Spelter. 1903.	Spelter. 1902.
January	28.33	23.54	4.075	4.000	4.865	4.27
February	29.43	24.07	4.075	4.075	5.043	4.15
March	....	26.32	....	4.075	....	4.28
April	....	27.77	....	4.075	....	4.37
May	....	29.85	....	4.075	....	4.47
June	....	29.36	....	4.075	....	4.96
July	....	28.38	....	4.075	....	5.27
August	....	28.23	....	4.075	....	5.44
September	....	26.60	....	4.075	....	5.49
October	....	26.07	....	4.075	....	5.38
November	....	25.68	....	4.075	....	5.18
December	....	25.68	....	4.075	....	4.78
Year	....	26.79	....	4.069	....	4.84

Note.—The average price of spelter in St. Louis for the month of January, 1903, was 4.689c. per lb.; for February, 4.861c.

Average Prices of Copper.

Month.	New York Electrolytic. 1903.	New York Electrolytic. 1902.	New York Lake. 1903.	New York Lake. 1902.	London Standard. 1903.	London Standard. 1902.
January	12.159	11.053	12.361	11.322	53.52	48.43
February	12.778	12.173	12.901	12.378	57.34	55.16
March	.....	11.882	.....	12.188	....	53.39
April	.....	11.618	.....	11.986	....	52.79
May	.....	11.856	.....	12.226	....	54.03
June	.....	12.110	.....	12.360	....	53.93
July	.....	11.771	.....	11.923	....	52.89
August	.....	11.404	.....	11.649	....	51.96
September	.....	11.480	.....	11.760	....	52.68
October	.....	11.449	.....	11.722	....	52.18
November	.....	11.288	.....	11.533	....	51.03
December	.....	11.430	.....	11.599	....	50.95
Year	.....	11.626	.....	11.887	....	52.46

New York prices are in cents, per pound; London prices in pounds sterling, per long ton of 2,240 lbs., standard copper. The prices for electrolytic copper are for cakes, ingots or wire bars; prices of cathodes are usually 0.25 cent lower.

Average Prices of Silver, per ounce Troy.

Month	1903. London. Pence.	1903. N. Y. Cents.	1902. London. Pence.	1902. N. Y. Cents.	1901. London. Pence.	1901. N. Y. Cents.
January	21.98	47.57	25.62	55.56	28.97	62.82
February	22.11	47.89	25.41	55.09	28.13	61.06
March	....	....	25.00	54.23	27.04	60.63
April	....	....	24.34	52.72	27.30	59.29
May	....	....	23.71	51.31	27.43	59.64
June	....	....	24.17	52.36	27.42	59.57
July	....	....	24.38	52.88	26.96	58.46
August	....	....	24.23	52.52	26.94	58.37
September	....	....	23.88	51.52	26.95	58.26
October	....	....	23.40	50.57	26.62	57.59
November	....	....	22.70	49.07	26.12	56.64
December	....	....	22.21	48.03	25.46	55.10
Year	....	....	24.09	52.16	27.11	58.95

The New York prices are per fine ounce; the London quotation is per standard ounce, .925 fine.

DIVIDENDS.

Name of Company.	Date.	Per Share.	Total.	Total to Date.
Alma Oil, Cal.	Mar. 1	.03	$12,000	$12,000
*Bunker Hill & Sull.	Mar. 4	.03	9,000	1,469,000
†Calumet & Hecla	Mar. 10	5.00	500,000	80,350,000
*Con. Mercur, Utah	Mar. 9	.03	30,000	940,000
*Daly West, Utah	Mar. 15	.60	108,000	2,583,000
†Gen'l Chem., com.	Mar. 10	1.25	92,629	1,022,650
†National Lead, pf.	Mar. 16	1.75	260,820	13,187,708
†Republic I. & St., pf.	April 1	1.75	356,246	5,531,439
*Silver King, Utah	Mar. 10	.66⅔	100,000	6,350,000
†Standard Oil	Mar. 16	20.00	19,400,000	183,435,000
†Trimountain Cop., Mich.	Mar. 10	1.50	150,000	150,000
Wolverine, Mich.	April 1	2.50	150,000	1,050,000

*Monthly †Quarterly.

ASSESSMENTS.

Name of Company.	Location.	No.	Delinq.	Sale.	Amt.
American	Utah	2	Mar. 6	Mar. 25	.01
Andes	Nev.	..	Feb. 16	Mar. 13	.10
Bald Eagle Oil	Cal.	..	Mar. 23	.....	.03
Burton	Utah	1	Mar. 18	Apr. 3	.001
Chollar	Nev.	61	Feb. 18	Mar. 12	.05
Con. Cal. & Va.	Nev.	18	Feb. 18	Mar. 11	.25
Crown Point	Nev.	88	Feb. 25	Mar. 18	.10
Free Silver	Utah	..	Feb. 23	Mar. 21	.00¼
Jenny Lind	Cal.	16	Feb. 22	Mar. 12	.01½
Jumbo	Utah	..	Mar. 2	Mar. 19	.00½
Justice	Nev.	..	Mar. 6	Mar. 27	.10
Little Chief	Utah	15	Mar. 10	Mar. 28	.01
Marina Marsicana	Cal.	34	Mar. 9	Mar. 30	.02
May Day	Utah	1	Mar. 7	Mar. 25	.01½
Mexican	Nev.	73	Feb. 25	Mar. 19	.10
New Independence	Cal.	..	Mar. 9	.....	.02
New Montezuma	Cal.	..	Mar. 2	.....	.02
Occidental	Nev.	41	Mar. 24	Apr. 14	.05
Savage	Nev.	109	Mar. 5	Mar. 26	.10
Sierra Nevada	Nev.	128	Feb. 25	Mar. 16	.10
South Sliger	Cal.	..	Mar. 30	.....	.03
Tetro	Utah	25	Feb. 28	Mar. 21	.02
Tonopah & Salt Lake	Nev.	1	Mar. 28	Apr. 17	.10
Ultimo	Cal.	..	Mar. 12	.....	.05
Union Con.	Nev.	66	Mar. 10	Mar. 30	.10
Wabash	Utah	..	Feb. 21	Mar. 12	.05
Wellington Oil	Cal.	..	Mar. 10	.....	.02
West Century	Utah	..	Mar. 7	Mar. 31	.01
Yellow Jacket	Nev.	13	Feb. 11	Mar. 19	.10

STOCK QUOTATIONS.

NEW YORK.

Company and Location.	par val	Feb. 24. H.	Feb. 24. L.	Feb. 26. H.	Feb. 26. L.	Feb. 27. H.	Feb. 27. L.	Feb. 28 H.	Feb. 28 L.	Mar. 2. H.	Mar. 2. L.	Mar. 3. H.	Mar. 3. L.	Sales
Acacia, Colo	$1	.08½	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,000
Alice, Mont.	25	.45	.....	.....	.....	.....	.....	.....	.....	.....	.....	.45	.....	500
Amalgamated c., Mont	100	75¾	73¾	74	72⅝	73¼	71⅛	72⅛	71½	74	72⅝	73	70⅛	357882
†Anaconda c. Mont.	25	125⅛	123	122½	121	121¼	121	.....	.....	123	121	121	116	12,900
Anaconda Gold, Colo.	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Belcher, Nev.	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Best & Belcher, Nev.	3	2.20	.....	.....	.....	.....	.....	.....	.....	2.60	.....	.....	.....	300
Brunswick, Cal.	1	.06	.....	.....	.....	.05½	.....	.....	.....	.05¼	.05	.05	.....	5,500
Bullion, Nev.	1	.....	.....	.10	.....	.....	.....	.....	.....	.....	.....	.13	.....	1,000
Caledonia, Nev.	2½	2.25	.....	.....	.....	2.00	.....	.....	.....	.....	.....	2.40	.....	400
Comstock T., s., Nev.	2	.14	.13	.15	.14	.15	.14½	.....	.....	.14	.13	.13½	.13	17,400
Comst T Bonds	100	.10½	.09½	.11½	.....	.12	.11½	.....	.....	.....	.....	.....	.....	17,500
Con. Cal. & Va., g. s.	2½	2.20	.....	2.30	.....	2.20	.....	.....	.....	2.25	.....	.....	.....	1,000
Confidence, Nev.	1	.....	.....	.....	.....	1.60	.....	.....	.....	.....	.....	.....	.....	200
Cons. Imperial, Colo.	1	.06	.....	.....	.....	.....	.....	.....	.....	.....	.....	.05	.....	1,500
Creede & C. C., Colo.	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cripple Creek c., Colo.	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.66	.....	1,000
Crown Point, Nev.	3	.40	.....	.....	.....	.....	.....	.....	.....	.45	.....	.....	.....	400
Daly, Utah	20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4.10	.....	100
Elkton g., Colo.	1	.40	.....	.....	.....	.40	.....	.....	.....	.....	.....	.....	.....	1,200
Gold Dollar, Colo.	1	.....	.....	.....	.....	.....	.....	.....	.....	.05	.....	.05	.....	3,000
Greene Con., c., Mex.	10	27.13	26.00	27.13	26.25	27.00	25.75	27.13	24.75	26.63	25.75	26.25	25.88	92,998
Horn Silver, Utah	25	.....	.....	.....	.....	.....	.....	.....	.....	1.25	1.00	.....	.....	500
Isabella, g., Colo.	1	.22	.....	.22	.....	.....	.....	.....	.....	.24	.....	.25	.24	2,600
Jack Pot, Colo.	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Justice, Nev.	1	.....	.....	.....	.....	.11	.....	.....	.....	.....	.....	.....	.....	400
Little Chief, Colo.	1	.09	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Mexican, Nev.	3	1.45	.....	1.65	.....	1.65	.....	.....	.....	.....	.....	.....	.....	600
Mollie Gibson, Colo.	5	.....	.....	.08	.....	.06½	.....	.....	.....	.....	.....	.....	.....	1,701
Occidental, Nev.	1	.....	.....	.....	.....	.50	.....	.....	.....	.....	.....	.....	.....	200
Ontario, Utah	100	.....	.....	.....	.....	6.50	.....	.....	.....	6.50	.....	6.50	.....	400
Ophir, s., Nev	1	2.25	.....	2.25	.....	2.40	.....	.....	.....	2.30	.....	2.20	.....	1,100
Overman, Nev.	1	.....	.....	.....	.....	.72	.68	.....	.....	.....	.....	.....	.....	600
Pharmacist, Colo.	1	.....	.....	.....	.....	.....	.....	.....	.....	.05½	.....	.....	.....	1,000
Portland, Colo.	10	1.50	.....	1.40	.....	1.50	.....	.....	.....	1.50	.....	.....	.....	8,300
Potosi, Nev.	3	.....	.....	.56	.55	.53	.52	.....	.....	.50	.....	.....	.....	1,200
Quicksilver, Cal.	100	.....	.....	.....	.....	.....	.....	1.63	.....	.....	.....	.....	.....	50
Sierra Nevada, Nev.	3	.....	.....	.....	.....	.....	.....	.....	.....	1.15	.....	.....	.....	300
Tenn. c., Tenn	25	.....	.....	.....	.....	.....	.....	.....	.....	32.13	29.50	32.38	32.00	13,400
Union Con., Nev.	2½	1.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	200
Union Cop., N. C.	10	3.00	.....	2.88	.....	2.75	2.63	3.00	2.63	2.50	2.38	1.38	.....	2,810
Utah Con., Nev.	1	.....	.....	1.40	.....	.....	.....	.....	.....	.....	.....	.....	.....	300
White Knob, g. s., Ida	100	.....	.....	.....	.....	11.00	.....	11.00	.....	.....	.....	.....	.....	200
Work, Colo.	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Yellow Jacket, Nev.	3	.55	.....	.....	.....	.55	.....	.....	.....	.....	.....	.....	.....	800

†Per Cent. Total sales 573,541 shares.

BOSTON, MASS.*

Name of Company.	par val	Shares listed.	Feb. 25. H.	Feb. 25. L.	Feb. 26. H.	Feb. 26. L.	Feb. 27. H.	Feb. 27. L.	Feb. 28. H.	Feb. 28. L.	Mar. 2. H.	Mar. 2. L.	Mar. 3. H.	Mar. 3. L.	Sales.
Adventure Con., c.	$25	100,000	14½	.....	14	13½	14½	14	.....	.....	13¼	12	12½	12	1,324
Allouez	25	80,000	6¼	6	6	5⅝	6	.....	.....	.....	5¼	.....	5¼	4½	4,100
Amalgamated, c.	100	1,538,879	75⅜	73⅛	73¾	71½	74¼	72⅜	.....	.....	73⅛	72½	73	70⅝	47,392
Am. Z. L. & Sm.	25	60,000	.....	.....	10	.....	11	.....	.....	.....	10	.....	.....	.....	140
Anaconda, c.	25	1,200,000	31¼	31	31	.....	30½	30¼	.....	.....	30¼	.....	29½	29	512
Arcadian, c.	25	150,000	5¾	5¼	5¼	5	5¼	5	.....	.....	5	4⅞	5	4¾	1,660
Arnold.	25	60,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Atlantic, c.	25	100,000	13⅜	13	13¼	12¾	13½	.....	.....	.....	13¼	13	13	12¾	1,490
Bingham Con., g. s.	50	150,000	36⅞	36½	35¾	34¼	36	35½	.....	.....	35	34½	34	33	2,483
Bonanza	10	300,000	.....	.....	.....	.....	.....	.....	.....	.....	.80	.....	.....	.....	200
British Columbia	15	250,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cal. & Hecla, c.	25	100,000	530	.....	520	.....	525	.....	.....	.....	525	520	525	.....	124
Catalpa	10	300,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Centennial, c.	25	90,000	31¼	31	31	30	31½	.....	.....	.....	31¼	31	30½	28¼	8,034
Central Oil.	25	60,050	7¼	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	110
Cochiti	10	182,250	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Con. Mercur, g.	5	1,000,000	1⅜	1⅝	1 1/16	1⅝	1¾	1⅝	.....	.....	1 1/16	.....	1¾	1⅝	4,845
Copper Range Con.	100	285,000	74½	73	72	69¾	73	71½	.....	.....	72	70½	70	68½	17,777
Crescent	10	300,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Daly-West., g. s.	20	180,000	40	.....	39½	.....	40	39	.....	.....	39½	38¾	39	.....	745
Dominion Coal.	100	150,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dominion Coal, pf.	100	30,000	.....	.....	117½	.....	.....	.....	.....	.....	.....	.....	117½	.....	62
Dominion I & S.	100	100,000	54⅛	54	54	53¾	54	53½	.....	.....	55¾	54	55½	54¼	5,785
Elm River	12	100,000	.....	.....	.....	.....	3½	.....	.....	.....	.....	.....	3¼	3	480
Franklin, c.	25	100,000	12	.....	11½	.....	.....	.....	.....	.....	11	.....	10½	10¼	384
Guanajuato Con.	5	385,000	2⅝	2½	2½	.....	.....	.....	.....	.....	2⅞	.....	3	2½	1,987
Isle Royale Con., c.	25	150,000	15	.....	14	.....	15	.....	.....	.....	14	.....	13½	.....	365
Mass Con., c.	25	100,000	15¼	15	14⅛	14	15½	14	.....	.....	13½	10½	11⅞	9¼	12,998
Mayflower, c.	25	100,000	.....	.....	2	1⅝	2	.....	.....	.....	.....	.....	2	.....	265
Michigan, c.	25	100,000	10¾	10½	10⅝	.....	10¾	10½	.....	.....	10⅜	10	10	9½	2,802
Mohawk, c.	25	100,000	55¾	54½	53¾	52	54½	54	.....	.....	55¼	54	54¼	51	3,085
Mont. Coal & Coke.	25	200,000	6¾	6⅜	7¼	7	7½	7	.....	.....	6⅞	6¾	.....	.....	2,000
Mont'l & Boston, c.	5	570,000	1⅞	.....	2	1⅝	1 1/16	1¾	.....	.....	1¾	1⅝	1¾	1⅝	3,060
National.	25	100,000	1⅛	.....	1¼	.....	.....	.....	.....	.....	.....	.....	.....	.....	75
Old Colony, c.	25	150,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Old Dominion, c.	25	96,150	.....	.....	22	21¼	21⅝	21	.....	.....	21	.....	20¼	.....	695
Osceola, c.	10	229,850	76	74½	74	73	74	73¼	.....	.....	74	.....	72¼	71	1,120
Parrot, s. c.	25	100,000	33	32¾	32	31	32½	32	.....	.....	31⅝	31	30	29½	930
Phoenix Con., c.	25	100,000	7	.....	6 13/16	.....	7	6⅝	.....	.....	7	6½	6¼	.....	736
Quincy, c.	25	100,000	120	.....	116	.....	120	.....	.....	.....	116	115	114	112½	81
Rhode Island, c.	10	250,000	3	.....	.....	.....	3	.....	.....	.....	3	.....	3	2½	400
Santa Fe, g. c.	10	183,296	2⅞	2¾	.....	.....	2¾	2½	.....	.....	.....	.....	12	10¾	885
Shannon, c.	25	60,000	13	12⅞	12¼	11¼	12¾	12½	.....	.....	12¼	12½	182	180	3,550
Tamarack, c.	25	80,000	188	185	188	180	.....	.....	.....	.....	182	.....	.....	.....	246
Tecumseh.	25	175,000	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	1¼	.....	270
Tennessee	25	100,000	.....	.....	.....	.....	.....	.....	.....	.....	31⅞	31	.....	.....	210
Trimountain	25	160,000	106¼	104⅞	104	101	105	.....	.....	.....	104	102	99	97¼	1,772
Trinity, c.	100	450,000	13¼	13	12¾	12¼	.....	.....	.....	.....	13¼	12½	12⅝	12	2,615
United States, g.	25	419,000	26	25½	.....	.....	26	25¾	.....	.....	25⅞	25½	.....	.....	10,141
U. S. Coal & Oil.	25	240,000	15¼	15	15	14⅞	15½	15	.....	.....	15	.....	14¾	14⅜	1,840
Utah Con., g.	5	300,000	31½	31	30	29	30¾	30	.....	.....	30½	29¼	29¼	28¾	9,966
Victoria, c.	25	100,000	8¼	8	7⅞	7½	7¾	7½	.....	.....	7⅛	7	7	6¾	1,579
Winona, c.	25	100,000	8½	8¼	8	7⅞	8¼	8	.....	.....	7⅞	7½	7½	7	2,803
Wolverine, c.	25	60,000	71	70	70	.....	70⅜	70	.....	.....	72¼	71½	72	70½	1,355
Wyandot.	25	100,000	1⅞	1⅝	.....	.....	.....	.....	.....	.....	.....	.....	1¾	.....	60

*Boston Stock Exchange. Total sales, 166,138 shares.

COAL, IRON AND INDUSTRIAL STOCKS.*

Name of Company.	Par val	Feb. 25. H.	Feb. 25. L.	Feb. 26. H.	Feb. 26. L.	Feb. 27. H.	Feb. 27. L.	Feb. 28. H.	Feb. 28. L.	Mar. 2. H.	Mar. 2. L.	Mar. 3. H.	Mar. 3. L.	Sales
Allis-Chalmers, U. S.	100	20	.....	20½	.....	20	....	21	20½	.....	.....	.....	.....	400
Allis-Chalm's, pf., U.S.	100	.....	.....	87	.....	.....	.....	.....	.....	.....	.....	.....	.....	200
Am. Agr. Chem., U.S.	100	23	.....	.....	.....	.....	.....	24½	22	25¼	24	.....	.....	20
Am. Agr. Chem. pf., U.S.	100	83½	.....	.....	.....	.....	.....	.....	.....	84½	.....	.....	.....	25
Am. Sm. & Ref., U.S.	100	51½	49⅛	52⅛	51¼	50	48⅜	50⅜	48⅞	50½	49⅜	49¾	48	30,250
Am. Sm. & Ref. pf., U.S.	100	97	..	97¾	.....	96¾	96	96¾	95½	96⅜	96½	96¾	95½	6,210
Am. Steel & Fdy., U.S.	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	17	.....	.....
Am. S. & Fdy. pf., U.S.	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Col. Fuel & I., Colo.	100	73½	73	74	.....	73	.....	.....	.....	72⅝	72½	72	69⅝	5,500
Col. & H. C. & I., Colo.	100	21⅜	21¼	21½	.....	21	20½	20¾	20½	20⅞	20½	20⅜	19¾	3,010
Crucible Steel, U. S.	100	20½	.....	20⅞	20¾	20¼	.....	.....	.....	.....	.....	.....	19⅝	690
Crucible Steel, pf., U.S.	100	86½	.....	86¼	85⅞	86½	86	.....	.....	86¼	86	86	85½	697
†Mong. R. Coal, Pa.	100	11⅝	.....	.....	.....	.....	.....	.....	.....	.....	.....	11¾	11½	330
†Mong. R. Coal pf., Pa	100	40¼	.....	40¼	.....	40¼	.....	.....	.....	40½	40	40¼	39½	1,140
National Lead, U.S.	100	26¾	26½	26¾	.....	26½	26	26⅜	.....	26	.....	26	.....	2,310
National Lead pf., U.S.	100	94	.....	94	.....	.....	.....	90	.....	90¼	90	90	.....	950
†Phila Nat. Gas	100	46½	46	46¼	.....	46	.....	.....	.....	.....	.....	.....	.....	280
†Phila Nat. Gas, pf.	100	.....	.....	91⅜	91	.....	.....	.....	.....	.....	.....	.....	.....	10
†Pittsburg Coal, Pa.	100	29	.....	29	.....	29	.....	.....	.....	.....	.....	29	28½	4,437
†Pittsburg Coal pf., Pa	100	91½	90⅜	91⅜	91	91½	91	.....	.....	.....	.....	91½	91	1,065
Republic I. & S., U.S.	100	22¼	21⅝	22⅜	21⅞	21⅞	21¼	22	21½	21⅝	21¼	21½	21	16,160
Republic I. & S., pf., U.S.	100	80	.....	80	.....	80	79⅞	79¾	79⅝	.....	.....	79¾	79½	2,030
Sloss-Shef S. & I., Ala.	100	71	.....	.....	.....	70¾	70½	70½	.....	71	69	.....	.....	2,500
Sloss-Sheff S. & I. pf., Ala.	100	.....	.....	97	96⅜	.....	.....	.....	.....	96	.....	.....	.....	300
Standard Oil, U.S.	100	700	695	705	697½	698¾	696	716	690	696	695	696¼	693	193
Tenn. C. I. & R. R., Ala.	100	67⅛	66	67	65¾	67	65¼	66	65	68⅛	65	65¼	63½	48,175
U. S. Red & Ref., U. S.	100	.....	.....	.....	.....	.....	.....	.....	.....	33½	.....	32	.....	200
U.S. Red & R. pf., U.S.	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	* 100
U.S. Steel Corp., U.S.	100	39	38⅜	39⅜	38⅞	38¾	38¼	38⅜	38¼	38⅜	38⅛	38⅛	37½	72,090
U.S. Steel Corp. pf., U.S.	100	88⅛	88	88⅞	88¼	88⅛	87½	87⅝	87¼	87⅞	87⅜	87¼	86½	46,308
Va.-Car Chem., U.S.	100	65	64½	.....	.....	64¼	.....	64	63½	64½	.....	64	61¾	3,885
Va.-Car Chem. pf., U.S.	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Va. I. C. & Coke, U. S.	100	40⅛	.....	39¾	39¾	.....	.....	39	.....	38¾	38½	38¼	38	920
.....	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

*New York Stock Exchange. †Pittsburg Stock Exchange. Total sales, 803,925 shares.

COLORADO SPRINGS, COLO.*

Name of Company.	Par val	Feb. 43†. H.	Feb. 43†. L.	Feb. 24. H.	Feb. 24. L.	Feb. 25. H.	Feb. 25. L.	Feb. 26. H.	Feb. 26. L.	Feb. 27. H.	Feb. 27. L.	Feb. 28. H.	Feb. 28. L.	Sales
Acacia	$1	.....	.....	.09½	.....	.09½	.09	.09½	.08½	.09¼	.08½	.09⅝	.09	2,000
Am. Con.	1	.....	.....	.02⅝	.....	.02⅝	.02½	.02⅝	.02½	.02⅝	.02¼	.02½	.02	4,000
Anaconda	1	.....	.....	.19	.....	.19	.....	.19	.....	.....	.....	.18	.13½	500
Ben Hur	1	.....	.....	.02⅝	.02⅜	.02⅝	.02¼	.02½	.02¼	.02½	.02¼	.02⅝	.02⅜	.....
Blue Bell	1	.....	.....	.08	.....	.08	.....	.08	.....	.....	.....	.08	.....	.....
C. C. & M.	1	.....	.....	.02½	.02	.02½	.02	.02½	.02	.02½	.02	.02⅜	.02	10,000
C. K. & N.	1	.....	.....	.18	.17	.18	.16¾	.18½	.18	.18½	.18	.18½	.....	6,100
C. C. Con.	1	.....	.....	.....	.....	.....	.05	.....	.05	.....	.....	.05¼	.05	1,000
Coriolanus	1	.....	.....	.04	.03	.04	.03½	.03¾	.03¼	.....	.03	.04	.02½	2,000
Des Moines	1	.....	.....	.....	.02¾	.03½	.02¾	.....	.02¾	.06	.03	.....	.03	1,000
Dr. Jack Pot.	1	.....	.....	.10	.....	.10	.09¾	.10	.09¾	.10	.09¾	.10	.....	2,000
Elkton Con.	1	.....	.....	.38½	.....	.38½	.37½	.38	.37½	.38	.36½	.38	.37⅝	9,150
El Paso	1	.....	.....	.64½	.....	.60	.59½	.59½	.59	.59½	.....	.61	.60	15,575
Fannie Rawlings	1	.....	.....	.....	.04	.06	.04	.05	.04½	.05¼	.04¼	.05	.04¼	3,000
Findley	1	.....	.....	.10¾	.10½	.10¾	.....	.10⅝	.10½	.10⅝	.10½	.11	.10¾	9,000
Gold Dollar Con.	1	.....	.....	.05⅝	.05½	.05⅝	.05½	.05½	.05	.05⅝	.05¼	.05¼	.05	15,000
Gold King	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Golden Cycle	1	.....	.....	.78½	.78	.78	.....	.80	.78	.79	.....	.79½	.79	8,000
Golden Fleece	1	.....	.....	.20	.05	.20	.05	.20	.05	.....	.05	.20	.05	.....
Gould	1	.....	.....	.04½	.....	.04½	.04¾	.04¾	.04¼	.04½	.04¾	.04½	.04⅜	11,500
Hart	1	.....	.....	.04	.02½	.....	.04	.02½	.04	.02½	.....	.....	.02½	.....
Isabella	1	.....	.....	.20½	.19	.19⅞	.19⅜	.19	.18¾	.19¾	.19¼	.20½	.20	37,900
Jack Pot	1	.....	.....	.12	.10	.11	.10	.10½	.10	.09½	.....	.12	.09½	.....
Last Dollar	1	.....	.....	.65	.....	.65	.....	.65	.....	.....	.....	.65	.....	.....
Lexington	1	.....	.....	.05	.04¾	.05	.04¾	.05½	.04¾	.05	.04¾	.05	.04¾	.....
Little Puck	1	.....	.....	.03	.03½	.03½	.03	.04	.03	.04	.03	.03½	.03	.....
Mollie Gibson	1	.....	.....	.....	.....	.06	.05½	.....	.....	.....	.....	.05½	.05½	500
Moon Anchor	1	.....	.....	.08½	.....	.11	.18½	.10	.08½	.11	.08	.11	.08	1,300
New Haven	1	.....	.....	.03	.02½	.03	.02¼	.02¾	.02¾	.02¾	.02¼	.02¼	.02¼	4,000
Pharmacist	1	.....	.....	.05	.04¾	.....	.04	.04¾	.04½	.05	.04¾	.05	.04¾	13,000
Pinnacle	1	.....	.....	.05	.04	.....	.04	.05	.04¾	.05	.04¼

STOCK QUOTATIONS.

MEXICO*. Feb. 20.

Name of Company	Shares Issued.	Last div'd	Prices. Bid.	Ask.
Durango.				
Ca. Min. de Penoles	2,500	$50.00	$4,000	$4,500
San Andres de la Sierra	200			
Guananjuato.				
Angustias, Pozos	2,400	5.00	95	100
Cinco Senores y An., aviadoras	2,000	15.00	257	260
Cinco Senores y An., aviada	400	10.00	240	250
Providencia, San Juan de la Luz	6,000	2.00	190	200
Queensland y Australia	300		110	120
Guerrero.				
Garduno y Anexas	7,200		35	60
Hidalgo.				
Amistad y Concordia	9,600	5.30	73	74
Carmen, aviada	1,100		125	140
Guadalupe Fresnillo mill	1,000		220	300
Guadalupe Fresnillo Mine	1,400		70	80
La Blanca, aviadora	1,539			1,130
La Blanca, aviada	768			850
La Reina y An., aviadora	5,600			25
Maravillas y An., aviador	1,680			
Maravillas el Lobo	1,000		150	180
Palma y An., aviador	1,800			12
Real del Monte	2,554	10.00	700	800
Santa Ana y An., aviadora	1,800		30	35
Santa Ana y An., aviada	600		25	30
Sta. Gertrudis y An., aviadas	9,600		7	8
Sta. Gertrudis y An., aviadora	28,800	1.00	80	80½
Santo Tomas Apostol aviadoras	5,100			40
San Felipe de Jesus, aviadora	3,600			
San Felipe de Jesus, aviada	1,200			10
San Rafael y An., Trompillo	1,200	12.00	870	890
San Rafael y An., aviada	1,200	$8.00	$370	$390
Soledad, aviada	960	5.00	300	320
Sorpresa, aviada	960	5.00	275	285
Mexico.				
Alacran	2,400			40
Buen Despacho	3,000		73	76
Dos Estrellas	3,000	30.00	2,160	2,170
La Esperanza (El Oro)	3,000	10.00	1,200	1,210
La Reformia, aviadores	2,000		60	63
Santa Ana, Esperanza	2,400			96
Michoacan.				
Luz de Borda, aviadora	3,000		60	65
Luz de Borda, aviada	1,000		9	10
San Luis Potosi.				
Concepcion y An	3,000		60	70
El Barreno, aviadora	2,000	2.00	56	57
Sta. Maria de la Paz	2,400	10.00	775	795
San Diego y Annexas	2,400	4.00	40	45
Zacatecas.				
Asturiana y An	2,500		45	
Candelaria y Pinos	2,500	10.00	310	330
Esperanza y An	2,400		50	60
Lourdes	2 500			
Luz de Minillas, pagadoras	2,000		20	30
San Carlos y Annexas	2,500	20.00		190
Sta. Maria de Gaud	2,500	10.00	125	135
Miscellaneous.				
Bartolome de Medina	2,000	1.50	73	75
Guadalupe Hacienda	10,000	3.00	250	260
La Luz Hac. (Pachuca)	3,750			280
La Reina (Chihuahua)	192			
Naica (Chihuahua)	100		6,000	
Natividad (Oaxaca) aviadora	1,800	6.00	550	650
Natividad (Oaxaca) aviadas	600	4.00	500	555
San Francisco Hac	6,000	1.00	42	40
Santa Ana Huantla Morelos	4,000			
Union Hacienda	3,000	5.00	275	285

*Values are in Mexican currency.

SAN FRANCISCO (*By Telegraph*).

Name of Company.	March. 2.	3.	Name of Company.	March. 2.	3.
Belcher	.54	.51	Justice	.09	.18
Best & Belcher	2.50	2.30	Mexican	1.55	1.55
Caledonia	2.20	2.30	Occidental Con	.50	.50
Challenge Con	.66	.63	Ophir	2.25	2.25
Chollar	.42	.44	Overman	.57	.56
Confidence	1.60	1.50	Potosi	.47	.47
Con. Cal. & Va	2.30	2.25	Savage	.42	.43
Con. Imperial	.04	.04	Sierra Nevada	1.05	1.05
Crown Point	.43	.40	Union Con	1.20	1.25
Gould & Curry	.55	.55	Utah Con	.36	.37
Hale & Norcross	1.05	1.10	Yellow Jacket	.65	.60

SALT LAKE CITY.* Feb. 27.

Name of Company	Shares.	Par Val	High	Low	Sales.
Ajax	300,000	$10	.30¾	.29½	1,900
Ben Butler	500,000	1	.08	.08	1,000
Bullion-Beck	100,000	10			
California	300,000	1	22½	19½	8,700
Carisa	500,000	1	18½	.18½	1,300
Century	150,000	1	.65	.65	300
Con. Mercur	1,000,000	5	1 73	1.68½	2,680
Daly			5.12½	3.85	4,420
Daly-Judge	300,000	1	11.00	10.15	2,595
Daly-West	180,000	20	39.65	38.80	580
Grand Central	250,000	1	5.27½	4.85	2,800
L. Mammoth	150,000	1	.69	.67	1,600
La Reine			.05	.04½	59,600
M. Washington			.07	.06	48,900
Mammoth	400,000	25			
May Day	400,000	.25	.15¾	.15½	4,900
N. Y. Bonanza			.28½	.21½	27,300
Ontario	150,000	100			
Sacramento	1,000,000	5	.27	.26¾	5,600
Star Con	500,000	1	.13½	13½	500
S Swansea	300,000	1	.25½	.23½	650
Sunshine	250,000	10			
Uncle Sam, Con	500,000	1	.25½	.24½	8,800
Victor	500,000	1	.24¾	.22¾	6,500
Wabash			.42½	.35	9,145
Yankee Con	500,000	1			

All mines are in Utah. *By our Special Correspondent. Total sales, 119,670 shares.

ST. LOUIS, MO.* Feb. 28.

Name.	Capital Stock.	Par Val.	Prices. Bid.	Ask.
Am.-Nettie, Colo	$3,000,000	$10	$0.60	$0.70
Catherine Lead, Mo.	500,000	10	1.50	3.00
Central Coal & C	1,875,000	100	66.75	68.00
Central C. & C., pf.	1,875,000	100	.70	.72
Central Lead, Mo	1,000,000	10	130.00	135.00
Columbia Lead, Mo.	$500,000	10	11.00	12.50
Con. Coal, Ill.	500,000	100	21.00	25.00
Doe Run Lead Co.	1,500,000	100	100.00	103.00
Granite Bimet., Mt.	1,000,000	10	1.00	1.10
St. Joe Lead, Mo	6,000,000	10	16 50	17.50

*From our Special Correspondent.

PHILADELPHIA, PA.*

Name and Location of Company.	par val	Feb. 25. H.	L.	Feb. 26. H.	L.	Feb. 27. H.	L.	Feb. 28. H.	L.	Mar. 2. H.	L.	Mar. 3. H.	L.	Sales
Am. Alkali, Mich	$50													
Am. Cement	10	8⅝	8⅛									8⅛	8 1/16	285
Cambria Iron, Pa	50	48⅞		48¼						48⅞				88
Cambria Steel, Pa	50	25	24⅞	24½	24¾	24¾	24¾	24¾		24¾	24½	24¾	24¼	2,178
Penn. Steel, pfd	100	92		92½	92					92½				445
Susq. I. & S., Pa	5	2⅜	2¼	2⅜	2¼	2¼		2¼		2⅜	2¼			3,995
United Gas I., Pa	50	112¼	112	112⅜	112	111⅞	111¼	111⅛	110¼	111	110½	110	108¾	4,410
Warwick I. & Steel	10	5⅛	5¼			5¼				5¼				396

*Reported by Townsend, Whelen & Co., 309 Walnut St., Philadelphia, Pa. Total sales 11,797 shares.

LONDON. Feb. 20.

Name and Country of Company	Shares Issued.	Par value. £. s. d.	Latest dividend. Amt. s. d.	Date	Quotations. Buyers. £ s. d.	Sellers. £ s. d.
Alaska-Treadwell, g., Alaska	200,000	5 0 0	1 6	Jan., 1903	4 12 6	4 15 0
Anaconda, c. s., Montana	1,200,000	5 0 6	2 0	Nov., 1902	5 18 9	6 1 3
Arizona, c., Def., ord	63,444	1 0 0	5 6	Feb., 1903	7 0 0	7 10 0
Arizona, pref., ord	316,530	1 0 0	5 6	Feb., 1903	7 7 6	7 12 6
Camp Bird, g., Colorado	738,000	1 0 0	0 7½	Mar., 1903	1 8 6	1 9 6
Copiapo, c., Chile	112,500	2 0 0	2 6	Feb., 1903	1 17 6	2 2 6
De Lamar, g. s., Idaho	80,000	1 0 0	2 0	Nov., 1902	13 9	16 3
Enterprise, g., British Col	165,000	1 0 0			2 6	7 6
El Oro, g., Mexico	980,000	1 0 0	1 6	Dec., 1902	1 10 0	1 12 6
Frontino & Bolivia, g., Colombia	128,662	1 0 0	3 0	July, 1901	18 9	1 1 3
Le Roi, g., British Col	200,000	5 0 0	5 0	Nov., 1898	1 5 0	1 7 6
Le Roi No. 2, g., British Col	120,000	5 0 0	5 0	May, 1902	17 6	1 0 0
Mesquital, Mexico	250,000	2 0	3	Feb., 1903	4 3	4 9
Montana, g. s., Montana	657,128	1 0 0	6	April, 1899	2 0	3 0
Mountain, c., Cal.	250,000	5 0 0	4 0	Nov., 1902	3 2 6	3 7 6
Stratton's Independence, Colorado	1,000,007	1 0 0	6	April, 1902	8 6	9 0
St. John del Rey., g., Brazil	543,265	1 0 0	6	Dec., 1902	14 6	15 6
Utah Con., g. c., (Highland Boy), Utah	300,000	1 0 0	7 0	Jan., 1903	6 0 0	6 10 0
Ymir, g., British Col	200,000	1 0 0	1 0	Mar., 1902	11 3	13 9
European:						
Linares, l., Spain	15,000	3 0 0	9	Oct., 1902	2 15 0	3 5 0
Mason & Barry, c., sul., Port'g'l	185,172	1 0 0	13 0	May, 1902	3 10 0	4 0 0
Rio Tinto, c., Spain	325,000	5 0 0	22 6	Nov., 1902	47 2 6	47 7 6
Rio Tinto, pref., Spain	325,000	5 0 0	2 6	Nov., 1902	6 0 0	6 5 0
Tharsis, c., Spain	625,000	2 0 0	8 0	May, 1902	4 12 6	4 17 6
Australia and New Zealand:						
Assoc. Gold Mines, W. Australia	495,388	1 0 0	1 6	Jan., 1900	1 18 9	2 1 3
Briscis, Tin, Tasmania	600,000	1 0 0			9 0	10 0
Broken Hill Pr'p., s., N. S. Wales	960,000	8 0	1 0	Feb., 1903	1 13 9	1 16 3
Cosmopolitan Prop., W. Australia	385,000	1 0 0	6	July, 1902	16 0	16 6
Golden Horse Shoe, W. Australia	300,000	5 0 0	6 0	Nov., 1902	9 17 6	10 0 0
Great Fingall Con., W. Australia	250,000	1 0 0	5 0	Sept., 1902	7 11 3	7 13 9
Great Bo'd'r Pr'p., W. Australia	1,750,000	2 0	6	Dec., 1902	1 1 9	1 2 3
Ivanhoe Gold Corp. W. Australia	200,000	5 0 0	4 0	Jan., 1903	8 10 0	8 12 6
Kalgurli, g., W. Australia	120,000	1 0 0	2 6	Jan., 1903	4 3 9	4 6 3
Lake View Cons., g., W. Australia	250,000	1 0 0	rts.	Aug., 1902	2 16 3	2 18 9
Mt. Lyell M. & R. I., c., Tasmania	275,000	3 0 0	1 0	Jan., 1903	2 17 6	3 0 0
Mt. Morgan, g., Queensland	1,000,000	1 0 0	3	Feb., 1903	4 2 6	4 7 6
Waihi, g., New Zealand	497,412	1 0 0	2 6	Mar., 1903	5 5 0	5 7 6
Indian:						
Champion Reef, g., Colar Fields	473,000	10 0	5 0	Jan., 1903	6 17 6	7 0 0
Mysore Gold, Colar Fields	530,000	10 0	rts.	Dec., 1902	7 2 6	7 5 0
Nundydroog, g., Colar Fields	484,000	10 0	1 3	Nov., 1902	2 3 9	2 6 3
Ooregum, g., Colar Fields	343,000	10 0	1 3	Dec., 1902	1 13 9	1 16 3
Ooregum, pref., g., Colar Fields	240,000	10 0	1 3	Dec., 1902	2 3 9	2 6 3
African:						
Angelo, g, Transvaal	600,000	1 0 0	6 0	Feb., 1903	7 12 6	7 15 0
Bonanza, Transvaal	200,000	1 0 0	12 0	Feb., 1903	5 12 6	5 15 0
British South Africa	4,430,019	1 0 0	rts.	May, 1899	3 5 0	3 7 6
Cape Copper, S. Africa	300,000	2 0 0	8 0	Jan., 1902	2 17 6	3 2 6
Cape Copper, pref., S. Africa	75,000	2 0 0	2 3	Jan., 1903	3 2 6	3 7 6
City and Sub'n (New), g., Transvaal	340,000	4 0 0	8 0	Aug., 1899	6 12 6	6 17 6
Crown Reef, g., Transvaal	120,000	1 0 0	15 0	Oct., 1902	17 10 0	18 0 0
De Beers Con., d., pref., Cape Colony	800,600	2 10 0		Jan., 1903	19 13 9	19 16 3
De Beers Con., def.	1,000,000	2 10 0	12 6	Jan., 1903	21 12 6	21 15 0
East Rand, Prop. Transvaal	970,000	1 0 0	rts.	May, 1902	8 5 0	8 7 6
Ferreira g., Transvaal	90,000	1 0 0	20 0	Feb., 1903	23 5 0	23 15 0
Geldenhuis Est., g., Transvaal	200,000	1 0 0	5 0	Feb., 1903	6 15 0	6 17 6
Geduld, g., Transvaal	400,600	1 0 0	rts.	Mar., 1902	8 1 3	8 2 6
Henry Nourse, g., Transvaal	125,000	1 0 0	8 0	Feb., 1903	8 17 6	9 2 6
Jagersfontein, d., Orange F. S.	200,000	5 0 0	6 0	Nov., 1899	25 17 6	26 2 6
Jubilee, g., Transvaal	50,000	1 0 0	bonus.	Aug., 1902	5 12 6	5 17 6
Jumpers, Transvaal	100,000	1 0 0	5 0	Aug., 1899	4 0 0	4 5 0
Langlaagte Est., g., Transvaal	470,000	1 0 0	3 0	Sept., 1899	4 5 0	4 7 6
May Con., g., Transvaal	288,750	1 0 0	3 0	Feb., 1903	4 10 0	4 12 6
Meyer & Charlton, g., Transvaal	100,000	1 0 0	3 0	Feb., 1903	5 12 6	5 17 6
Namaqua, c., Cape Colony	94,331	2 0 0	2 0	June, 1902	3 12 6	3 17 6
Primrose (New), g., Transvaal	325,000	1 0 0	2 0	Feb., 1903	3 18 9	4 1 3
Rand Mines, g., S. Africa	1,795,956	5 0	4 0	Aug., 1902	11 0 0	11 1 3
Robinson, g., Transvaal	750,000	5 0 0	6 0	Feb., 1903	10 15 0	11 0 0
Robinson Deep, g., Transvaal	950,000	1 0 0	5 0	May, 1899	5 3 9	5 6 3
Rose Deep, Transvaal	425,000	1 0 0	2 0	Feb. 1903	8 17 6	9 2 6
Salisbury, g., Transvaal	100,000	1 0 0	2 0	Mar., 1899	2 15 0	3 0 0
Sheba, g., Transvaal	1,075,000	1 0 0	6	July, 1898	1 5 0	1 6 3
Village Main Reef, Transvaal	400,000	1 0 0	5 0	Oct., 1902	8 15 0	9 0 0
Wemmer, Transvaal	80,000	1 0 0	10 0	Jan., 1903	13 0 0	13 10 0

c.—Copper. d.—Diamonds. g.—Gold. l.—Lead. s.—Silver.

LONDON. (*By Cable*).*

Name of Company.	Feb. 24. £.	s.	d.	Mar. 3. £.	s.	d.	Name of Company	Feb. 24. £	s.	d.	Mar. 3. £.	s.	d.
Anaconda	6	2	6	6	0	0	Johannesburg Invest	3	6	3	3	7	6
British South Africa	3	5	0	3	6	3	Modderfontein	10	17	6	10	17	6
Camp Bird	1	9	3	1	12	3	Rand Mines	10	16	3	10	17	6
Con. Gold-Fields	7	15	0	7	16	3	Rio Tinto com	48	7	6	49	11	3
De Beers Con. def	21	7	6	21	16	3	Simmer & Jack	1	15	0	1	13	9
East Rand	8	2	6	8	3	9	Tomboy	1	18	9	1	17	6
Jagersfontein	26	5	0	26	12	6							

*Furnished by Wm. P. Bonbright & Co., 15 Wall St., New York.

PARIS. Feb. 11

Name of Company.	Country.	Product.	Capital Stock. Francs.	Par value. Fr.	Latest divs. Fr.	Prices. Opening. Fr.	Closing Fr.
Boleo	Lower Cal	Copper		500	176.00	1,350.00	1,340.00
Champ d'Or	S. Africa	Gold	3,375,000	25	3.75	23.00	23.00
Fraser River	Brit. Col'mb.	Gold	250,000	25		6.50	6.50
Huanchaca	Bolivia	Silver	40,000,000	125	5.00	51.50	97.00
Metaux, Cie. Fran. de	France	Metal dealers.	25,000,000	500	22.50	477.00	470.50
Nickel	N. Caled'nia.	Nickel	15,000,000	250	22.50	460.00	445.00
Rebecca	Colo'do, U. S.	Gold	5,000,000	25		1.00	1.00
Vielle Montagne	Belgium	Zinc	9,000,000	30	30.00	632.50	630.00

TORONTO, ONT.* Feb. 28.

Name of Company.	par val	Prices. High.	Low.	Sales.	Name of Company	Par val	Prices. High.	Low.	Sales.
Black Tail	$1	.07	.02		Granby Smelter	$10	525	475	
Cariboo (Mc. K.)	1	.16	.12		Mountain Lion	1	.16	.10	
Cariboo (Hyd.)	1	.75			North Star	1	.13	.10	1,000
Center Star	1	.33	.30		Nova Scotia Steel, com	100	113	110	
Crows Nest, C	100	400	300		Payne	1	.21	.18½	2,000
Dominion Coal, com	100	129	126¾		Rambler Cariboo	1	.33	.25	
Dominion S. & I	100	56	53½	50	Republic	1	.07	.05	
Dominion S. & I., pref.	100				St. Eugene	1	.35	.25	
Fairview	1	.05½	.04½	1,500	Virtue	1	.09	.05	
Giant	1	.03½	.02		War Eagle Con	1	.19½	.16	1,000

*Standard Stock and Mining Exchange. Total sales 5,550 shares.

DIVIDENDS.

GOLD, SILVER, COPPER, LEAD, QUICKSILVER AND ZINC COMPANIES.

Name and Location of Company.		Authorized Capital Stock.	Shares. Issued.	Par Val	Dividends. Paid 1903	Total to Date.	Latest. Date	Amt.
Adams, s. l. c	Colo.	$1,500,000	150,000	$10	.....	$738,500	Oct. 1902	.05
Aetna Con., q	Cal	500,000	100,000	5	.....	225,000	Apr. 1900	.15
Alaska-Mexican, g	Alaska.	1,000,000	180,000	5	$18,000	483,381	Jan. 1903	.10
Alaska-Treadwell, g	Alaska.	5,000,000	200,000	25	75,000	5,195,000	Jan 1903	.37½
Amalgamated, c	Mont.	155,000,000	1,538,879	100	769,430	20,426,110	Feb. 1903	.50
Am. Sm. & Ref., pf	U. S.	50,000,000	500,000	100	875,000	9,706,553	Jan. 1903	1.75
Anaconda, c	Mont.	30,000,000	1,200,000	25	.....	22,050,000	Nov. 1902	.50
Annie Laurie, g	Utah.	2,000,000	20,000	100	.....	60,000	Dec. 1902	1.00
Arizona, c	Ariz.	3,775,000	.....	...	501,564	3,947,032	Feb. 1903	.....
Atlantic, c	Mich.	1,000,000	40,000	25	.....	940,000	Feb. 1901	2.00
Bald Butte, g, s	Mont.	250,000	250,000	1	30,000	1,327,148	Feb. 1903	.06
Boston, q	Cal	1,000,000	100,000	10	.....	20,000	Jan. 1900	.10
Boston & Colo Sm	Colo.	750,000	15,000	50	.....	402,350	Oct. 1902	.75
Boston Gold-Copper Sm	Colo.	1,000,000	1,000,000	1	.....	150,000	Nov 1901	.02½
Boston & Mont. Con., c. s. g	Mont.	3,750,000	150,000	25	300,000	27,425,000	Jan. 1903	2.00
Breece, l. s	Colo.	5,000,000	200,000	25	.....	190,000	Sept. 1902	.05
Bunker Hill & Sullivan	Idaho	3,000,000	300,000	10	27,000	1,465,000	Mar. 1903	.03
Butte & Boston, c	Mont.	2,000,000	200,000	10	.....	1,600,000	Nov. 1901	3.00
Butterfly-Terrible, g	Colo.	1,500,000	1,250,000	1	.....	31,250	Oct. 1901	.00½
C. K. & N, g	Colo	1,500,000	1,431,900	1	14,319	28,638	Mar. 1903	.01
Calumet & Hecla, c	Mich.	2,500,000	100,000	25	500,000	80,350,000	Mar. 1903	5.00
Camp Bird, g	Colo.	5,500,000	738,000	5	110,700	332,100	Mar. 1903	.15
Carisa g. s. c	Utah.	500,000	500,000	1	.....	30,000	Nov. 1901	.03
Centennial Eureka, g. s. l. c	Utah.	5,000,000	100,000	25	.....	2,667,700	Jan. 1902	.50
Center Creek, l. z	Mo	1,000,000	100,000	10	.....	80,000	Mar. 1902	.10
Central Eureka, g	Cal	4,000,000	398,425	10	.....	23,718	Sept. 1902	.02
Central, l	Mo	1,000,000	10,000	100	10,000	335,000	Feb. 1903	.50
Cherry Hill, g	Cal	1,000,000	1,000,000	1	.....	47,500	June. 1902	.00½
Chippewa Con., g. s. l	Colo.	150,000	150,000	1	.....	2,500	Dec. 1902	.00½
Con. Mercur, g	Utah.	5,000,000	1,000,000	5	90,000	940,000	Mar. 1903	.03
Continental, z	Mo	550,000	22,000	25	.....	17,600	Oct. 1902	.40
Cripple Creek, g pf	Colo.	125,000	125,000	;	.....	45,000	Jan. 1902	.04
Croesus, g	Cal	1,000,000	200,000	5	.....	227,300	Aug 1901	.05
Dalton & Lark, g. s. l	Utah.	2,500,000	2,500,000	1	.....	350,000	July. 1901	.10
Daly West,	Utah.	3,600,000	180,000	20	324,000	2,583,000	Mar. 1903	.60
De Lamar, g. s	Idaho	400,000	67,181	5	.....	2,708,094	Oct. 1902	.48
Doctor-Jack Pot Con., g	Colo.	3,000,000	2,900,000	1	.....	232,000	Aug 1901	.01
Doe Run, l	Mo	1,500,000	1,500,000	100	22,500	559,372	Jan. 1903	1.50
Ducktown c. i. sul. (Ord)	Tenn.	374,000	74,800	5	.....	165,250	Dec. 1901	.25
Ducktown (Fndr)	Tenn.	1,000	200	5	.....	75,250	May. 1901	75.00
Elkton Con., g	Colo.	3,000,000	2,500,000	1	.....	1,404,461	Mar 1902	.04
Empire State-Idaho, l. s	Idaho	6,000,000	505,542	10	75,831	1,637,493	Mar. 1903	.05
Free Coinage, g	Colo.	1,000,000	10,000	100	.....	160,000	Dec. 1902	.20
Gemini	Utah.	500,000	5,000	100	.....	850,000	Oct. 1902	20.00
Gold Coin of Victor, g	Colo.	1,000,000	1,000,000	1	10,000	1,230,000	Jan. 1903	.01
Gold King, g	Colo.	1,000,000	936,850	1	.....	412,214	July. 1901	.03
Golden Argus, g	Cal	800,000	8,000	100	.....	2,000	Dec. 1902	.25
Golden Cycle, g	Colo.	2,000,000	1,500,000	1	37,500	93,750	Feb. 1903	.01½
Golden Eagle, g	Colo.	500,000	489,015	1	.....	98,916	Sept. 1901	.01
Good Hope, g. s	Colo.	50,000	500	100	12,500	12,500	Jan. 1903	.25
Gwin, g	Cal	1,000,000	100,000	10	.....	426,500	Dec. 1902	.15
Hecla Con., s. l	Mont.	1,500,000	30,000	50	.....	2,250,000	July. 1901	.50
Homestake, g	S. D.	21,840,000	218,400	100	109,200	11,821,350	Feb. 1903	.25
Horn Silver, g. s. c. z. l	Utah.	10,000,000	400,000	25	.....	5,342,000	Dec. 1901	.10
Independence Con., g	Colo.	2,500,000	2,500,000	1	.....	281,375	Apr. 1901	.04
Ingham Con., g	Colo.	750,000	1,359,600	½	.....	33,981	Aug. 1901	.00¼
Iowa, g. s. l	Colo.	1,666,667	1,666,667	1	16,667	236,838	Jan. 1903	.01
Iron Silver	Colo.	10,000,000	500,000	20	.....	2,550,000	Dec 1900	.10
Isabella, g	Colo.	2,250,000	2,250,000	1	.....	742,500	Mar 1901	.01
Jamison g	Cal	3,900,000	390,000	10	11,700	74,100	Jan 1903	.03
Katinka, g	Colo.	1,000,000	1,000,000	1	.....	10,000	Nov 1901	.01
Kendrick & Gelder Sm	Colo.	1,000,000	1,000,000	1	.....	20,000	Dec. 1901	.01
Kennedy, g	Cal	10,000,000	100,000	100	.....	1,801,000	June. 1901	.05
La Fortuna, g	Ariz.	250,000	250,000	1	.....	1,062,500	Oct. 1902	.05
Last Dollar, g	Colo.	1,500,000	1,500,000	1	30,000	210,000	Mar. 1903	.02
Liberty Bell, g	Colo.	700,000	130,349	5	19,552	32,587	Jan. 1903	.15
Lightner, g	Cal	125,000	102,255	1	.....	33,250	July 1902	.05
Lillie, g	Colo.	1,250,000	250,000	5	.....	349,183	Apr. 1900	.05
Mammoth, g. s. c	Utah.	10,000,000	400,000	25	.....	1,860,000	July. 1901	.05
Mary McKinney, g	Colo.	1,000,000	1,000,000	1	30,000	500,000	Jan. 1903	.03
May Day, g	Utah.	100,000	400,000	¼	.....	30,000	Mar 1902	.01
Midget, g	Colo.	1,000,000	1,000,000	1	.....	195,000	Apr. 1902	.15
Modoc, g. s	Colo.	500,000	500,000	1	5,000	255,000	Jan 1903	.01
Mont. Ore Purchasing	Mont.	2,500,000	81,000	25	162,000	2,808,000	Jan. 1903	2.00
Mountain, c	Cal	6,250,000	250,000	25	.....	3,633,750	Nov. 1902	.96
Mine La Motte, l	Mo	3,000,000	300,000	10	60,000	60,000	Jan. 1903	.20
Napa Con., q	Cal	700,000	100,000	7	.....	1,180,000	Oct. 1902	.10
National Lead, com	U. S.	15,000,000	149,054	100	.....	1,341,486	Mar. 1900	1.00
National Lead, pfd	U. S.	15,000,000	149,040	100	260,820	13,187,708	Mar. 1903	1.75
New Idria, q	Cal	5,000,000	100,000	5	30,000	430,000	Jan. 1903	.30
New Jersey, z	U. S.	10,000,000	100,000	100	300,000	5,100,000	Feb. 1903	3.00
New Leadville Home, g	Colo.	2,000,000	2,000,000	1	.....	265,500	Feb. 1902	.00¾
Nugget, g	Colo.	1,000,000	991,000	1	.....	84,730	July. 1901	.01
Old Colony Zinc & Sm	Mo	1,000,000	69,909	10	.....	138,184	Nov 1901	.25
Ontario, s. l	Utah.	15,000,000	150,000	100	.....	14,917,000	Dec. 1902	.30
Osceola, c	Mich.	2,500,000	96,150	25	.....	4,247,300	Dec. 1901	3.00
Parrot, c	Mont.	2,300,000	229,850	10	.....	5,772,925	Jan. 1902	.50
Pioneer, g	Alaska.	5,000,000	50,000	100	.....	300,005	Dec. 1902	6.00
Plumas Eureka, g	Cal	1,405,250	150,625	10	.....	2,831,294	Apr. 1901	.24
Pointer, g	Colo.	1,250,000	1,250,000	1	.....	25,000	June. 1901	.01
Portland, g	Colo.	3,000,000	3,000,000	1	90,000	4,387,080	Jan. 1903	.03
Pride of the West	Ariz.	1,500,000	150,000	10	.....	15,000	Oct. 1902	.10
Quicksilver, pfd	Cal	4,300,000	43,000	100	.....	1,909,911	May. 1902	.50
Quincy, c	Mich.	2,500,000	100,000	25	250,000	13,820,000	Feb. 1903	2 50
Rob Roy, z	Mo	15,000	13,725	1	549	915	Jan. 1903	.04
Rocco-Homestake-Nevada, l. s.	Nev.	300,000	240,000	1	.....	90,000	Nov. 1902	.01
Sacramento, g	Utah.	5,000,000	1,000,000	5	10,000	143,000	Feb. 1903	.00½
St. Joseph, l	Mo	6,000,000	375,000	10	.....	3,609,500	Dec. 1902	.15
Silver Hill, g. s	Nev.	180,000	180,000	1	.....	10,800	Dec. 1902	.05
Silver King, g. s. l	Utah.	3,000,000	150,000	20	300,000	6,350,000	Mar. 1903	.66⅔
Smuggler, s. l. z	Colo.	1,000,000	1,000,000	1	.....	2,175,000	Feb. 1902	.01
Spearfish, g. pf	So. Dak	1,000,000	882,000	1	17,640	35,280	Feb. 1903	.01
Specie Payment, g	Colo.	1,000,000	100,000	1	.....	40,190	Oct. 1902	.02
Standard Con., g. s	Cal	2,000,000	178,394	10	17,839	4,124,653	Feb. 1903	.10
Standard, s. l	Idaho	500,000	500,000	1	.....	2,565,000	Apr. 1902	.05
Stratton's Independence, g	Colo.	5,500,000	1,000,007	5	.....	3,770,880	Apr. 1902	.12
Swansea, s. l	Utah.	500,000	100,000	5	.....	330,500	June 1901	.05
Syndicate, g	Cal	100,000	100,000	1	.....	82,000	Aug. 1902	.02
Tamarack, c	Mich.	1,500,000	60,000	25	.....	8,490,000	Dec. 1901	10.00
Tomboy, g. s	Colo.	1,500,000	300,000	5	.....	1,244,000	July. 1902	.24
Town Topics, g. c	Colo.	1,000,000	1,000,000	1	.....	35,000	Dec. 1902	.00½
Trimountain, c	Mich.	2,500,000	100,000	25	150,000	150,000	Mar. 1903	1 50
Trinity County, g	Cal	1,000,000	100,000	10	15,000	15,000	Mar. 1903	.05
Uncle Sam Con	Utah.	500,000	500,000	1	.....	45,000	Nov. 1901	.03
Union, g	Colo.	1,250,000	1,250,000	1	.....	445,244	Jan. 1902	.02
Union, z. l	Kas.	500,000	300,000	1	.....	16,000	July. 1901	.01
United, c, pf	Mont.	5,000,000	50,000	100	.....	150,000	Nov 1902	3.00
United, g	Colo.	5,000,000	3,994,769	1	40,091	319,933	Jan. 1903	.01
United, z. l., com	Mo	5,000,000	78,990	5	3,882	19,079	Jan. 1903	.05
United, z. l., pfd	Mo	1,000,000	18,998	25	8,520	90,575	Jan. 1903	.50
United Verde, c	Ariz.	3,000,000	300,000	10	.....	10,785,322	Dec. 1901	.75
U. S. Red. & Ref., com	Colo	6,000,000	59,188	100	59,188	236,414	Jan. 1903	1.00
U. S. Red. & Ref., pf	Colo.	4,000,000	39,458	100	59,187	295,260	Jan. 1903	1.50
Utah, g	Utah.	1,000,000	100,000	10	4,000	211,000	Feb. 1903	02
Utah Con., c	Utah.	1,500,000	300,000	5	504,000	1,236,000	Jan. 1903	1.68
Vindicator Con., g	Colo.	1,500,000	1,100,000	1	55,000	972,000	Jan. 1903	.05
Waldorf, g	Colo.	3,000,000	3,000,000	1	.....	25,000	Dec. 1902	.08½
Wasp No. 2, g	S. Dak.	500,000	147,900	1	.....	218,410	June. 1902	.00½
White Rock, g	Nev.	500,000	200,000	2½	.....	2,000	Aug. 1902	.01
Wolverine, c	Mich.	1,500,000	60,000	25	150,000	1,050,000	Apr. 1903	2.50
Yankee Con., g. s. l	Utah.	500,000	500,000	1	.....	75,000	Apr. 1902	.05
Yellow Aster, g	Cal	1,000,000	100,000	10	10,000	483,789	Jan. 1903	.10

NOTE.—These dividends are published gratuitously. Readers are invited to send any corrections or additions which they think necessary to complete our list.

COAL, IRON AND INDUSTRIALS.

Name and Location of Company.		Authorized Capital Stock.	Shares. Issued.	Par Val	Dividends. Paid 1903.	Total to Date.	Latest. Date	Amt.
Ala. Con., Coal & Iron, pfd	Ala.	$2,500,000	$24,638	$100	$43,117	$560,529	Mar. 1903	$1.75
Ala. & Ga. Iron, pf	.....	650,000	6,500	100	$6,500	6,500	Jan. 1903	1.00
Allis-Chalmers, pfd	U. S.	25,000,000	162,500	100	284,375	1,990,625	Feb. 1903	1.75
Alma Oil	Cal	400,000	400,000	1	12,000	12,000	Mar. 1903	.03
Altoona Coal & Coke Co	Pa.	2,500,000	250,000	10	.....	75,000	Jan. 1901	.30
Amer. Agr. Chem., pfd	U. S.	20,000,000	181,350	100	.....	3,582,690	Oct. 1902	3.00
American Cement	Pa.	2,100,000	200,000	10	80,000	460,000	Jan. 1903	.40
American Coal	Md	1,500,000	60,000	25	75,000	1,357,500	Jan. 1903	1.25
American Iron & Steel, com	Pa.	17,000,000	34,000	50	.....	256,100	May. 1902	.15
American Iron & Steel, pfd	Pa.	3,000,000	60,000	50	37,500	487,500	Jan. 1903	.62½
American Steel Foundries, pfd	U. S.	15,500,000	155,000	100	232,500	465,000	Mar. 1903	1.50
Aztec Oil	Cal	250,000	235,000	1	.....	16,450	Aug. 1902	.03
California Oil & Gas	Cal.	2,000,000	200,000	10	.....	540,000	Sept. 1901	.70
Cambria Steel	Pa.	50,000,000	900,000	50	675,000	5,775,000	Feb. 1903	.75
Central Coal & Coke, com	Mo	6,125,000	51,250	100	76,875	320,625	Jan. 1903	1.50
Central Coal & Coke, pfd	Mo	1,875,000	18,750	100	31,875	734,999	Jan. 1903	1.25
Central Oil	W.Va.	1,500,000	60,000	25	.....	112,500	Aug. 1902	.25
Central Oil	Cal.	1,000,000	800,000	1	.....	164,247	Jan. 1902	.03
Colorado Fuel & Iron, com	Colo.	38,000,000	239,310	100	.....	1,642,500	Apr. 1902	1.75
Colorado Fuel & Iron, pfd	Colo.	2,000,000	20,000	100	80,000	1,560,000	Feb. 1903	4.00
Columbus & Hocking C. & I	Ohio	7,000,000	69,220	100	34,610	69,220	Mar. 1903	.50
Consolidation Coal	Md.	10,250,000	102,500	100	205,000	5,728,000	Jan. 1903	2.00
Consolidated Coal	Ill.	5,000,000	50,000	100	.....	100 000	Jan. 1902	1.00
Crucible Steel, pfd	U. S.	25,000,000	250,000	100	.....	3,937,500	Dec. 1902	1.75
Dominion Iron & Steel, pf	U. S.	5,000,000	50,000	100	.....	525,000	Oct. 1902	3.50
Empire Steel & Iron, pfd	U. S.	5,000,000	23,700	100	35,550	355,442	Jan 1903	1.50
Federal Chem., pfd	Ky.	1,500,000	15,000	100	.....	90,000	Oct. 1902	1.50
Four Oil	Cal.	300,000	208,700	1	4,174	31,305	Feb. 1903	.01
General Chem., com	U. S.	12,500,000	74,103	100	92,629	1,022,650	Mar. 1903	1.25
General Chem., pfd	U. S.	12,500,000	100,000	100	141,240	2,116,418	Jan. 1903	1.50
George's Creek Coal & Iron	Md	2,500,000	22,000	100	33,000	.....	Jan. 1903	3.00
Giant Oil	Cal	500,000	500,000	1	5,000	5,000	Jan. 1903	.01
Hanford Oil	Cal.	20,000	2,000	10	.....	13,000	Sept. 1902	1.50
Heywood Oil	Tex.	800,000	800,000	1	16,000	144,000	Jan. 1903	.02
Higgins Oil	Tex.	2,500,000	17,609	100	.....	96,850	Apr. 1902	1.50
Home Oil	Cal.	100,000	100,000	1	15,000	465,000	Feb. 1903	.07½
Homestake Oil	Cal.	100,000	10,000	10	.....	33,000	Aug. 1902	.15
Houston Oil, pfd	Tex.	7,500,000	75,000	100	224,125	896,500	Feb. 1903	3.00
Imperial Oil	Cal.	1,000,000	100,000	100	40,000	300,000	Feb. 1903	.20
Int'l Acheson Graphite, pfd	N. Y.	500,000	5,000	100	17,500	87,500	Feb. 1903	3 50
Jeff. & Clearf., Coal & Iron, com	Pa.	1,500,000	15,000	100	.....	105,000	Aug. 1902	5.00
Jeff. & Clearf., Coal & Iron, pfd	Pa.	1,500,000	15,000	100	37,500	563,000	Feb. 1903	2.50
Lehigh Coal & Nav	Pa.	14,346,850	286,933	50	.....	20,095,120	Nov 1902	1.00
Maryland Coal, pfd	Md.	2,000,000	18,850	100	.....	885,910	Dec. 1902	5.00
Monongahela R. Coal, pfd	Pa.	10,000,000	98,300	50	347,165	2,777,180	Jan. 1903	3.50
Monte Cristo Oil	Cal	500,000	500,000	1	10,000	10,000	Feb. 1903	.01
National Carbon, pf	U. S.	4,500,000	45,000	100	78,750	1,338,750	Feb. 1903	1.75
Ohio & Indiana Natural Gas	U. S.	10,000,000	90,000	100	90,000	1,170,000	Mar. 1903	1.00
Pacific Coast Borax	Cal.	2,000,000	19,000	100	38,000	1,255,500	Feb. 1903	1.00
Peerless Oil	Cal.	1,000,000	92,000	10	18,400	65,320	Feb. 1903	.10
Pennsylvania Salt Mfg	Pa.	5,000,000	100,000	50	.....	13,150,000	Sept. 1902	3.00
Penna. Steel,	Pa.	25,000,000	165,000	100	.....	2,023,750	Nov 1902	3.50
Philadelphia Gas, com	Pa.	16,102,131	308,542	50	231,406	2,722,613	Feb. 1903	.75
Philadelphia Gas, pfd	Pa.	3,998,350	212,873	50	99,959	906,108	Mar. 1903	1.25
Pittsburg Coal, pfd	Pa.	32,000,000	297,012	100	519,771	6,757,023	Jan. 1903	1.75
Producers & Con. Oil	Cal.	1,000,000	10,000	100	.....	56,500	Mar 1901	.10
Rep. Iron & Steel, pfd	U. S.	25,000,000	203,569	100	712,492	5,336,786	Apr. 1903	1.75
Retsof Salt	N. Y.	5,000,000	36,000	100	36,000	612,000	Jan. 1903	1.00
San Joaquin Oil	Cal.	100,000	100,000	1	.....	60,000	Oct. 1902	.05
Shawmut Oil	W. Va.	1,250,000	50,000	25	.....	150,000	Dec. 1902	.50
Shelby Iron	Ala.	1,000,000	10,000	100	.....	690,000	Nov. 1902	6.00
Sloss-Sheffield Steel & Iron, pfd	Ala.	20,000,000	67,000	100	117,250	1,394,000	Jan. 1903	1.75
Standard Oil (of N. J.)	U. S.	100,000,000	970,000	100	19,400,000	183435,000	Mar. 1902	20.00
Susquehanna I. & S., pfd	Pa.	1,500,000	300,000	5	45,000	717,500	Jan. 1903	.15
Temple Iron	Pa.	240,000	2,400	100	7,200	14,400	Jan. 1903	3.00
Tenn. C. I. & R. R., com	Tenn	23,000,000	225,536	100	.....	1,102,144	Nov. 1900	2.00
Tenn. C. I. & R. R., pfd	Tenn	248,000	2,480	100	4,960	292,175	Feb. 1903	2.00
Tex. & Pacific Coal	Tex.	2,000,000	20,000	100	30,000	2,070,000	Jan. 1903	1.50
Thirty-three Oil	Cal.	500,000	100,000	5	10 000	130,000	Jan. 1903	.10
Thomas Iron	Pa.	2,500,000	25,000	100	.....	200,000	Aug. 1902	4.00
Tidewater Steel, pfd	Pa.	600,000	6,000	1	18,000	18,000	Jan. 1903	.30
Union Oil	Cal.	10,000,000	52,672	100	36,870	334,465	Jan. 1903	.70
U. S. Crude Oil	Cal.	100,000	100,000	1	.....	27,220	Dec. 1901	.02
U. S. Marble	Wash.	2,000,000	2,000,000	1	.....	20,000	June. 1901	.00¼
U. S. Steel Corp., com	U. S.	550,000,000	5,085,257	100	5,085,257	25,624,435	Mar. 1903	1.00
U. S. Steel Corp., pfd	U. S.	550,000,000	5,103,147	100	8,930,497	62,676,123	Feb. 1903	1 75
Va.-Carolina Chem., com	U. S.	38,000,000	279,844	100	349,805	3,329,064	Mar. 1903	1.25
Va.-Carolina Chem., pfd	U. S.	12,000,000	120,000	100	240,000	6,300,000	Jan. 1903	2.00
Ventura Con. Oil	Cal.	1,000,000	1,000,000	1	.....	5,000	Feb. 1902	.00¾
Victoria Coal & Coke, com	W. Va.	150,000	1,500	100	.....	15,000	Jan. 1901	10.00
Victoria Coal & Coke, pfd	W. Va.	100,000	1,000	100	.....	15,000	July. 1902	3.00
Warner Oil	Cal.	200,000	200,000	1	.....	10,000	June 1901	.01
Westmoreland Coal	Pa.	5,000,000	250,000	50	.....	7,500,000	Sept. 1902	1.50
West Shore Oil	Cal.	100,000	100,000	1	10,000	55,000	Feb. 1903	.05

C[redacted]RAL AND SOUTH AMERICA, MEXICO.

Name and Location of Company.		Authorized Capital Stock.	Shares. Issued.	Par Val	Dividends. Paid 1903.	Total to Date.	Latest. Date	Amt.
Amistad y Concordia	Mex.	$480,000	9,000	$50	$18,270	$97,300	Jan. 1903	$2.03
Barreno	Mex.	.....	2,400	...	2,648	46,198	Feb. 1903	.75
Bartolome de Medina Mill	Mex.	50,000	2,000	25	3,080	66,563	Feb. 1903	.77
Bosun, s. l	B. C.	250,000	50,000	5	.....	12,500	Apr. 1901	.25
Cariboo McKinney, g	B. C.	1,250,000	1,250,000	1	.....	496,837	Mar 1902	.01½
Center Star, g	B. C.	3,500,000	3,500,000	1	.....	210,000	May. 1901	.01
Cinco Senores	Mex.	.....	2,000	...	15,280	671,385	Feb. 1903	3.82
Copiapo, c	Chile	1,125,000	112,500	10	39,900	2,865,900	Feb. 1903	.36
El Oro, g. s	Mex.	5,000,000	980,000	5	.....	1,886,100	Dec. 1902	.36
Esperanza, s. g	Mex.	150,000	3,000	50	22,710	1,092,789	Feb. 1903	3.75
Frontino & Bolivia c	Colom.	643,310	128,662	5	.....	1,211,703	July 1901	.72
Goodenough, s. l	B. C.	800,000	659,400	1	.....	13,188	Jan. 1902	.01
Greene Con., c	Mex.	7,200,000	720,000	10	288,000	508,000	Feb. 1903	.20
Guadalupe Mill	Mex.	1,000,000	10,000	100	15,400	3,503,350	Feb. 1903	.77
Le Roi, g	B. C.	5,000,000	200,000	25	.....	1,305,000	Nov 1899	1.20
Le Roi No. 2, g	B. C.	3,000,000	120,000	25	.....	288,000	May 1902	1.20
Mesquital	Mex.	125,000	250,000	½	15,000	51,458	Feb. 1903	.06
Metallurgical Co., of Torreou	Mex.	1,250,000	25,000	50	187,500	187,500	Apr. 1903	7.50
Natividad, s. g	Mex.	36,000	2,400	15	7,536	171,162	Feb. 1903	1.57
N. Y. & Hond. Rosario, s. g	C. A.	1,500,000	150,000	10	30,000	1,880,000	Feb. 1903	.10
North Star, s. l	B. C.	1,500,000	1,300,000	1	.....	312,000	Sept. 1902	.01½
Nova Scotia St. & Coal, com	N. S.	5,000,000	50,000	100	.....	123,600	Apr. 1902	4.00
Nova Scotia St. & Coal, pfd	N. S.	2,000,000	10,300	100	.....	61,800	Apr. 1902	2.00
Payne Con., s. l	B. C.	3,000,000	2,600,000	1	.....	1,438,000	Jan. 1901	.02
Penoles (Map.), s. l	Mex.	125,000	2,500	50	47,825	2,026,114	Jan. 1903	19.13
Providencia (S. J.)	Mex.	90,000	6,000	15	9,240	169,740	Feb. 1903	.77
Rambler-Cariboo, s. l	B. C.	1,250,000	1,250,000	1	.....	220,000	Nov 1902	.01
Reco, s. l	B. C.	1,000,000	1,000,000	1	.....	287,500	Aug. 1900	.10
St. John del Rey, g	Brazil	3,000,000	546,265	5	.....	14,095,995	Dec. 1902	.12
San Carlos Minillas	Mex.	12,500	2,500	5	.....	234,329	Feb. 1902	4.43
Soledad, s. l	Mex.	19,200	960	20	3,639	225,880	Feb. 1903	1.88
Sorpressa	Mex.	19,200	960	20	.....	185,653	July. 1901	2.18
Sta. Maria de Guadalupe	Mex.	2,500	2,500	1	.....	377,918	Sept. 1902	4.08
Sta. Maria de la Paz	Mex.	.....	2,400	....	.....	1,848,273	Dec. 1902	7.65
San Diego de Char	Mex.	96,000	2,400	40	.....	61,100	Nov. 1901	.83
San Francisco Mill	Mex.	50,000	6,000	25	.....	284,760	Nov 1902	.40
Sta. Gertrudis	Mex.	1,920,000	38,400	50	22,032	2,669,376	Feb. 1903	.....
San Rafael	Mex.	60,000	2,400	25	18,180	1,792,248	Feb. 1903	.....
St. Eugene Con., s. l	B. C.	3,500,000	3,500,000	1	.....	210,000	Apr 1901	.03
Union Mill	Mex.	150,000	3,000	50	.....	384,270	Dec. 1902	2.00
War Eagle Con., g. s. c	B. C.	2,000,000	1,750,000	1	.....	545,250	Feb. 1900	.01½
Ymir, g	B. C.	1,000,000	200,000	5	.....	288,000	Mar 1902	.24

CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.

(See also Market Reviews.)

ABRASIVES—	Cust.Meas.	Price.
Carborundum, f.o.b. Niagara Falls, Powd., F.FF.FFF.	lb.	$0.08
Grains	"	.10
Corundum, N. C.	"	.07@.10
Chester, Mass.	"	.04½@.05
Barry's Bay, Ont.	"	.07½@.09½
Mont., car-lots, f.o.b., Chicago	"	.07@.07½
Crushed Steel, f.o.b. Pittsburg	"	.05½
Emery, Turkish flour in kegs	"	.03½
Grains, in kegs	"	.05@.05½
Naxos flour, in kegs	"	.03½
Grains, in kegs	"	.05@.05½
Chester flour, in kegs	"	.03½
Grains, in kegs	"	.05@.05½
Peekskill, f.o.b. Easton, Pa., flour, in kegs	"	.01½
Grains, in kegs	"	.02½
Crude, ex-ship N. Y.; Abbott (Turkey)	lg.ton	26.50@30.00
Kuluk (Turkey)	"	22.00@24.00
Naxos (Greek) h. gr.	"	26.00
Garnet, as per quality	sh.ton	25.00@35.00
Pumice Stone, Am. Powd	lb.	.01⅝@.02
Italian, powdered	"	.01½
Lump, per quality	"	.04@.40
Rottenstone, ground	"	.02½@.04½
Lump, per quality	"	.06@.20
Rouge, per quality	"	.10@.30
Steel Emery, f.o.b. Pittsburg.	"	.07
ACIDS—		
Boracic, crystals	"	.10¾@.11
Powdered	"	.11¼@.11½
Carbonic, liquid gas	"	.12½
Chromic, crude	"	.20
Hydrofluoric, 30%	"	.03
48%	"	.05
60%	"	.11
Sulphurous, liquid anhy. f.o.b. Bound Brook, N.J.	"	.06
ALCOHOL—Grain	gal.	2.43@2.45
Refined wood 95@97%	"	.60@.65
Purified	"	1.20@1.50
ALUM—Lump	100 lbs.	1.75
Ground	"	1.80
Powdered	"	3.00
Chrome, com'l	"	2.75@3.00
ALUMINUM—		
Nitrate	lb.	1.50
Oxide, com'l, common	"	.06½
Best	"	.20
Pure	"	.80
Hydrated	100 lbs.	2.60
Sulphate, com'l	"	1.25@1.50
AMMONIA—		
Aqua, 16°	lb.	.03
18°	"	.03¼
20°	"	.03¾
26°	"	.05½
AMMONIUM—		
Carbonate, lump	"	.07¼
Powdered	"	.08
Muriate	"	.05⅝
Lump	"	.08¼
Nitrate, white pure (99%)	"	.12
Phosphate, com'l	"	.09
Pure	"	.12
ANTIMONY—Glass	"	.30@.40
Needle, lump	"	.05½@.06
Powdered, ordinary	"	.05¾@.07¼
Oxide, com'l white, 95%	"	.09½
Com'l white, 95%	"	.12
Com'l gray	"	.07
Sulphuret, com'l	"	.16
ARSENIC—White powd.	"	.02¾@.03½
Red	"	.06¾@.07
ASPHALTUM—		
Ventura, Cal.	sh.ton	32.00
Cuban	lb.	.01½@.03½
Egyptian, crude	"	.05½@.06
Trinidad, refined	sh.ton	35.00
San Valentino (Italian)	lg.ton	16.00
Seyssel (French), mastic	sh.ton	21.00
Gilsonite, Utah, ordinary	lb.	.03
Select	"	.03¾
BARIUM—		
Carb. Lump, 80@90%	sh.ton	25.00@27.50
92@98%	"	26.00@29.00
Powdered, 80@90%	lb.	.01¾@.02
Chloride, com'l	100 lbs.	1.67½@1.76
Chem. pure cryst	lb.	.05
Nitrate, powdered	"	.05½

BARIUM	Cust.Meas.	Price.
Sulphate (Blanc Fixe)	lb.	$0.02
BARYTES—		
Am. Crude, No. 1	sh.ton	9.00
Crude, No. 2	"	8.00
Crude, No. 3	"	7.75
German, gray	"	14.50
Snow white	"	17.00
BAUXITE—Ga. or Ala. Mines:		
First Grade	lg.ton	5.50
Second grade	"	4.75
BISMUTH—Subnitrate	lb.	1.40
Subcarbonate	"	1.65
BITUMEN—"B"	"	.03½
"A"	"	.05
BONE ASH	"	.02½@.02½
BORAX	"	.07¼@.07½
BROMINE	"	.35
CADMIUM—Metallic	"	1.40
Sulphate	100 lbs.	2.00@2.50
CALCIUM—Acetate, gray	"	1.30
" brown	"	.90
Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J.	sh.ton	70.00
Carbonate, ppt.	lb.	.05
Chloride	100 lbs.	.70@.90
CEMENT—		
Portland, Am., 400 lbs.	bbl.	1.70@1.90
Foreign	"	1.65@2.25
"Rosendale," 300 lbs	"	.75
Slag cement, imported	"	1.65
CERESINE—		
Orange and Yellow	lb.	.12½
White	"	.13½
CHALK—Lump, bulk	sh.ton	2.50
Ppt. per quality	lb.	.03¾@.06
CHLORINE—Liquid	"	.30
Water	"	.10
CHROME ORE—		
(50% ch.) ex-ship N. Y.	lg.ton	24.75
Bricks f.o.b. Pittsburg	M	175.00
CLAY, CHINA—Am. com., ex-dock, N. Y.	lg.ton	8.00
Am. best, ex-dock, N. Y.	"	9.00
English, common	"	12.00
Best grade	"	17.00
Fire Clay, ordinary	sh.ton	4.25
Best	"	6.00
Slip Clay	"	5.00
COAL TAR PITCH	gal.	.08
COBALT—Carbonate	lb.	1.75
Nitrate	"	1.50
Oxide—Black	"	2.26@2.30
Gray	"	2.28@2.40
Smalt, blue ordinary	"	.06
Best	"	.20
COPPERAS—in bulk	100 lbs.	.42½
In bbls	"	.47½
COPPER—Carbonate	lb.	.18@.19
Chloride	"	.25
Nitrate, crystals	"	.35
Oxide, com'l	"	.19
CRYOLITE	"	.06½
EXPLOSIVES—		
Blasting powder, A.	25 lb. keg	.65
Blasting powder, B.	"	1.40
"Rackarock," A.	lb.	.25
"Rackarock" B.	"	.18
Judson R.R. powder	"	.10
Dynamite (20% nitro-glycerine)	"	.18
(30% nitro-glycerine)	"	.14
(40% nitro-glycerine)	"	.15
(50% nitro-glycerine)	"	.16½
(60% nitro-glycerine)	"	.18
(75% nitro-glycerine)	"	.21
Glycerine for ultro, (32-2-10° Be.)	"	.13⅝@.13¾
FELDSPAR—Ground	sh.ton	8.00@9.00
FLINT PEBBLES—Dan. Best.	lg.ton	14.75
French, Best	"	11.75
FLUORSPAR—		
Am. lump. 1st grade	sh.ton	14.40
2d grade	"	13.90
Gravel and crushed, 1st gr	"	13.40
2d grade	"	12.40
Ground, 1st grade	"	17.90
Ground, 2d grade	"	16.50
Foreign, lump	"	8.00@12.00
Ground	"	11.50@14.00
FULLER'S EARTH—Lump	100 lbs.	.75
Powdered	"	.80

GRAPHITE—Am. f.o.b. Providence, R. I., lump	Cust.Meas. sh.ton	Price. $8.00
Pulverized	"	30.00
German, com. pulv.	lb.	.01¼@.01½
Best pulverized	"	.01½@.02
Ceylon, common pulv.	"	.02¾@.03½
Best pulverized	"	.04@.08
Italian, pulv.	"	.01@
GYPSUM—Ground	sh.ton	8.00@8.50
Fertilizer	"	7.00
Rock	lg.ton	4.00
English and French	"	14.00@16.00
INFUSORIAL EARTH—Gr'd.		
American best	"	20.00
French	"	37.50
German	"	40.00
IODINE—Crude	100 lbs.	2.45
IRON—Muriate	lb.	.05
Nitrate, com'l	"	.01¼
True	"	.04
Oxide, pure copperas color.	"	.05@.10
Purple-brown	"	.02
Venetian red	"	.01@.01½
Scale	"	.01@.03
KAOLIN—(See China Clay.)		
KRYOLITH—(See Cryolite.)		
LEAD—Acetate, white	"	.08@.08¼
Brown	"	.06@.06¼
Nitrate, com'l	"	.06½
" gran.	"	.08¼
LIME—Com., abt. 250 lbs.	bbl.	.80
Finishing	"	.90
MAGNESITE—Greece.		
Crude (95%)	lg.ton	6.00@6.50
Calcined	sh.ton	17.50@18.00
Bricks	M	170.00
Am. Bricks, f.o.b. Pittsburg	"	175.00
MAGNESIUM—		
Carbonate, light, fine pd.	lb.	.05
Blocks	"	.07@.09
Chloride, com'l	"	.01¾
Fused	"	.20
Nitrate	"	.60
Sulphate	100 lbs.	.75@.95
MANGANESE—Powdered, 70@75% binoxide	lb.	.01¼@.01½
Crude pow'd. 75@85% binoxide	"	.01½@.02¼
85@90% binoxide	"	.02¼@.03¼
90@95% binoxide	"	.03¼@.05½
Carbonate	"	.16@.20
Chloride	"	.04
Ore, 50%, Foreign	unit	.18@.19
Domestic	"	.30
MARBLE—Flour	sh.ton	6.00@7.00
MERCURY—Bichloride	lb.	.77
MICA—N. Y. gr'nd, coarse	sh.ton	33.00@38.00
Fine	lb.	.00⅝@.02
Sheets, N. C., 2x4 in.	"	.30
3x3 in.	"	.80
3x4 in.	"	1.50
4x4 in.	"	2.00
6x6 in.	"	3.00
MINERAL WOOL—		
Slag, ordinary	sh.ton	19.00
Selected	"	25.00
Rock, ordinary	"	32.00
Selected	"	40.00
NICKEL Oxide, No. 1	lb.	1.00
No. 2	"	.60
Sulphate	"	.20@.21
OILS—Black, reduced 29 gr.:		
25@30, cold test	gal.	.11½@.12½
15, cold test	"	.12½@.12¾
Zero	"	.13½@.13¾
Summer	"	.11@.12
Cylinder, dark steam ref.	"	.10¼@.11¾
Dark, filtered	"	.15½@.17½
Light, filtered	"	.16½@.19
Extra cold test	"	.27½@.31½
Gasoline, 86°@90°	"	.15@.20
Naphtha, crude, 68°@72°	bbl.	9.05
"Stove"	gal.	.12½
Linseed, domestic raw	"	.44@.46
Boiled	"	.48
Calcutta, raw	"	.75
OZOKERITE	lb.	.11½
PAINTS AND COLORS—		
Chrome green, common	"	.05
Pure	"	.16
Yellow, common	"	.10¼
Best	"	.25
Lampblack, com'l	"	.04½
Refined	"	.07
Litharge, Am. pow'd	"	.04¾@.05½
English flake	"	.08¼@.08½
Glassmakers'	"	.07¼@.08

PAINTS AND COLORS—	Cust.Meas.	Price.
Metallic, brown	sh.ton	$19.00
Red	"	16.00
Ocher, Am. common	"	9.25@10.00
Best	"	21.25@25.00
Dutch, washed	lb.	.04¾
French, washed	"	.01½@.01⅝
Orange mineral, Am.	"	.07¾@.08
Foreign, as to make	"	.08¼@.11¼
Paris green, pure, bulk	"	.10¾@.11
Red lead, American	"	.05¾@.06
Foreign	"	.06⅝@.08
Turpentine, spirits	gal.	.65½@.65¾
White lead, Am., dry	lb.	.04½@.04¾
American, in oil	"	.05½@.05¾
Foreign, in oil	"	.06⅞@.09¼
Zinc, white, Am., ex dry.	"	.04⅝@.04⅝
American, red seal	"	.06⅛
Green seal	"	.07
Foreign, red seal, dry	"	.05¾@.08¼
Green seal, dry	"	.06½@.09¼
POTASH		
Caustic, ordinary	"	.04½@.04⅝
Elect. (90%)	"	.06¼
POTASSIUM—		
Bicarbonate cryst	"	.08¼
Powdered or gran.	"	.14
Bichromate, Am.	"	.08¼@.08¾
Scotch	"	.08½@.09
Bromide, bulk	"	.22
Carbonate (80@85%)	"	.02¾@.03
Chromate	"	.35
Cyanide (98@99%)	"	.20@.21¼
Kainit	lg.ton	9.05
Manure salt, 20%	100 lbs.	.66
D'le Manure Salt, 48@53%	"	1.12
Muriate, 80@85%	"	1.33
95%	"	1.86
Permanganate	lb.	.09¼@.10
Prussiate, yellow	"	.13@.13¼
Red	"	.33
Sulphate, 90%	100lbs.	2.11
96%	"	2.14
Sylvanit	unit	.39½
QUARTZ—(See Silica).		
SALT—N. Y. com. fine 280 lbs	bbl.	.72@1.18
N. Y. agricultural	sh.ton	4.40
SALTPETRE—Crude	100lbs.	3.37½@3.40
Refined	"	4.25@4.62½
SILICA—Best foreign	lg.ton	10.00@11.00
Ground quartz, ord	sh.ton	6.00@8.00
Best	"	12.00@13.00
Lump quartz	"	2.50@4.00
Glass sand	"	2.75
SILVER—Chloride	oz.	.65
Nitrate	"	.30½
Oxide	"	.85@1.10
SODIUM—		
Bichromate	lb.	.06¼
Chlorate, com'l	"	.07¼@.07¾
Hyposulphite, Am.	100 lbs.	1.60@1.65
German	"	1.70@1.90
Nitrate, spot	"	2.00
Shipments	"	1.85@1.97½
Peroxide	lb.	.45
Phosphate	"	.02⅛@.02¼
Prussiate	"	.09¾
Silicate, conc.	"	.08
Com'l	"	.01
Sulphate, com'l	100 lb.	.75@82½
Sulphide	lb.	.01¼
Sulphite crystals	"	.02½
SULPHUR—Roll	100 lbs.	1.85
Flour	"	1.90
Flowers, sublimed	"	2.15
TALC—N. C., 1st grade	sh.ton	13.75
N. Y., Fibrous, best	"	10.20
French, best	100 lbs.	1.25
Italian, best	"	1.62½
TAR—Regular	bbl.	2.30
Oil barrels	"	4.30
TIN—Crystals	lb.	.22
Oxide	"	.45
URANIUM—Oxide	"	2.25@3.00
ZINC—Metallic, ch. pure	"	.07@.09⅛
Carbonate, ppt.	"	.09
Chloride solution, com'l	"	.02¼
Chloride granular	"	.04¼@.04⅝
Dust	"	.04⅝@.04½
Sulphate	"	.02⅛@.02¼

THE RARE EARTHS.

BORON—Nitrate	lb.	$1.50
CALCIUM—Tungstate (Scheelite)	"	.60
CERIUM—Nitrate	"	10.00
DIDYMIUM—Nitrate	"	35.00
ERBIUM—Nitrate	"	40.00
GLUCINUM—Nitrate	"	30.00
LANTHANUM—Nitrate	"	30.00
LITHIUM—Nitrate	oz.	.60
STRONTIUM—Nitrate	lb.	.07@.07¾
THORIUM—Nitrate 49@50%.	"	4.50
URANIUM—Nitrate	oz.	.25
YTTRIUM—Nitrate	lb.	40.00
ZIRCONIUM—Nitrate	"	8.00

Note.—These quotations are for wholesale lots in New York unless otherwise specified, and are generally subject to the usual trade discounts. Readers of the Engineering and Mining Journal are requested to report any corrections needed, or to suggest additions which they may consider advisable.